JANIS 40
CHAPTER III

03

14/7/8 006199

JOINT ARMY-NAVY INTELLIGENCE STUDY

EUROPEAN U.S.S.R.

OCEANOGRAPHY

This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U.S.C., 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

LIST OF EFFECTIVE PAGES, CHAPTER III

TABLE OF CONTENTS

Note: This chapter is based upon material available in Washington, D. C., on 1 January 1947.

Chapter III

OCEANOGRAPHY

Prepared under cognizance of Office of Naval Intelligence by Hydrographic Office with assistance from U. S. Coast and Geodetic Survey

30. INTRODUCTION

A. Summary

The ocean coasts of European U.S.S.R. consist of three widely separated sectors. The *north coastal sector* borders on the southern Barents Sea (1) and includes the Beloye More (White Sea) (109) and a portion of the Karskoye More (Kara Sea) (18). The *west coastal sector* is the Baltic Sea (890) coast, including the Gulf of Riga (866) and the south and east coasts of the Gulf of Finland (801). The *south coastal sector* borders on the northwestern Black Sea (901) and includes most of the Azovskoye More (Sea of Azov) (945). (Places mentioned in Chapter III may be located on the area index maps, FIGURES III-51 to III-53, by referring to the number which appears in parentheses after each place name.)

The north coastal sector has semidiurnal tides with small diurnal inequality. Tidal range is affected by topography and varies from place to place. The west and south coastal sectors have negligible lunar tide, but undergo periodic fluctuation in water level under the influence of wind, atmospheric pressure, river discharge, and the annual thermal cycle.

The current regime off the north coastal sector is dominated by a current from the Atlantic Ocean recognizable as an extension of the Gulf Stream. A complicated pattern of tidal currents and wind-driven currents also exists. Local currents of wind origin also are found in the numerous channels and sounds of the west coastal sector, with a slow circulation out of the Baltic Sea (890) representing the excess over evaporation of water supplied by rivers. A fairly steady current system exists off the south coastal sector, subject to seasonal variations and the influence of prevailing winds.

Sea conditions in the summer months are good for all three coastal sectors. They are generally poor in the winter, although in the presence of ice the wind fetch is reduced, resulting in lower wave heights. Currents will also temporarily affect wave height and steepness, depending upon the degree to which current direction and wind direction are opposed. Information on swell conditions is inadequate, but it is unlikely that severe swell will occur independently of high seas, particularly in the protected waters of the west and south coastal areas.

Ice forms in winter off all the coasts of European U.S.S.R. except the Murmanskiy Bereg (Murman Coast) (311) in the north coastal sector. The Beloye More (White Sea) (109) has a short navigation season comparable to that of our Great Lakes, and sea ice forms over all the area east of its entrance. In the west coastal sector the Gulf of Finland (801) is closed to navigation for about three months, but most ports farther south on the Baltic Sea (890) can either be entered all winter by ordinary vessels or be kept open by icebreakers. In the south coastal sector, Sevastopol' (931) normally is ice-free, and most other ports south of latitude 45°30′ N are open all winter. Icebergs do not occur in any waters of the area.

The coastal waters of European U.S.S.R. are fairly cool, with summer maximum surface water temperatures of about 60° F. in the Beloye More (White Sea) (109) and 50° F. in the open Barents Sea (1); 70° F. at the head of the Gulf of Finland (801) and 60° F. in most of the rest of the Baltic Sea (890); and 75° F. in the south coastal sector.

The surface salinity of the open Barents Sea (1) is that of the normal Atlantic Ocean, 34 to 35 parts per thousand. It drops to about 20 parts per thousand in the northern part of the Beloye More (White Sea) (109), and still lower toward the heads of the gulfs and off the mouth of the Pechora (43). In the Gulf of Finland (801), it increases from 2 or less at the head to 6 at the mouth, and in the Baltic Sea (890) it ranges between 6 and 8 parts per thousand. Surface salinity in the open Black Sea (901) is 17 to 18 parts per thousand, decreasing off river mouths. *Dead water* in a mild form is encountered along the Murmanskiy Bereg (311) and may also occur in the Black Sea (901).

In the north coastal sector the color of the offshore Gulf Stream water is intense blue; the coastal waters are greenish. The waters of the west coastal sector are of various shades of green, yellow-green, and greenish brown. The Black Sea (901) is probably greenish near shore and blue offshore. In all sectors the coastal waters are less transparent than those offshore, and are least transparent in spring and early summer.

Electrical conductivity of the surface waters ranges from a minimum of 0.002 reciprocal ohms per cubic centimeter near river mouths to a summer offshore maximum of 0.035 in the north coastal sector, 0.015 in the west coastal sector, and 0.025 in the south coastal sector.

In the north coastal sector, well-developed temperature and salinity gradients in summer in the Beloye More (White Sea) (109), result in short periscope-depth and

assured ranges. During late spring and early fall there is a limited period of isothermal water with long ranges at all depths. Temperature inversions (increase of temperature with depth) in the same months result in long periscope-depth ranges and short assured ranges. In the Barents Sea (1) off the Pechora (43) short periscope-depth and assured ranges will also prevail during the summer. Offshore the mean depth of isothermal water is 100 feet, resulting in long periscope-depth ranges (2,000 yards or more); the well-developed negative temperature gradients below this isothermal layer result in short assured ranges (1,200 to 1,400 yards).

In the eastern part of the Gulf of Finland (801) during spring and summer, periscope-depth and assured ranges will be short, increasing in the central portion of the gulf to 2,000 yards or more for periscope-depth and 1,200 to 1,400 yards for assured range. Long periscope-depth ranges and short assured ranges, resulting from temperature inversions, will be encountered in the Gulf of Finland (801) in early spring and late fall. In the Baltic Sea (890) in the summer, the depth of the isothermal layer will be 100 to 150 feet, resulting in long periscope-depth ranges and assured ranges of 1,400 to 1,600 yards. During limited periods in late spring and early fall, the isothermal layer will increase to over 400 feet in depth, giving rise to long ranges at all depths.

In the south coastal sector, offshore in the Black Sea (901) the periscope-depth range during summer will usually be long, 2,000 yards or more, and the assured range 1,200 to 1,600 yards. In the northwest portion of this sector, influenced by discharge from the Danube (902) and other rivers, extreme temperature and salinity gradients exist in spring and summer, resulting in short periscope-depth and assured ranges; in the fall, although isothermal conditions exist, salinity gradients will still lead to short sonar ranges.

Snapping shrimp have not been reported from any of the coastal waters of European U.S.S.R., and few of the other noise-making organisms are known to be present. Fish feeding on molluscs or crustaceans will probably be heard, however, in all coastal waters; likewise, seals and porpoises in the north and south coastal sectors; and whales in the Barents Sea (1) may give rise to spurious echoes.

Positive ballast increments of 10,000 to 20,000 pounds when diving from periscope depth to 400 feet will be necessary to maintain trim at depth in spring and summer in the Beloye More (White Sea) (109), in the Barents Sea (1), off the Pechora (43), and in the northwestern portion of the Black Sea (901). Similar increments of 10,000 pounds or more will be necessary inshore in the Gulf of Finland (801) from late spring to early fall. In the Baltic (890) and the central waters of the Gulf of Finland (801) ballast increments will be positive in the summer but may be positive, isoballast, or negative in spring and fall. Offshore in the Barents Sea (1) ballast increments will usually be positive, but may be negative during periods of isothermal water or temperature inversion. Offshore in the Black Sea (901) ballast increments will usually be positive in the summer, but will be isoballast or negative in spring and fall. In the northwestern portion of the Black Sea (901) in early spring and late fall, although isoballast conditions will be indicated by BT card, vertical salinity gradients will usually necessitate flooding to attain trim.

Hydrogen sulfide, a highly toxic gas, is found dissolved in the water of the Black Sea (901) below about 400 feet, the content increasing with depth.

Bottom sediments off the north coastal sector vary with locality. Mud, stone, or sand make up much of the floor of the Barents Sea (1); inshore, rock or stone are found west of Novaya Zemlya (2) and are common off the headlands, around the small islands, and in the straits; patches of mud characterize the deeper portions of the Beloye More (White Sea) (109) and the inlets. There also are areas, many of considerable extent, of sand, sand and mud, or clay.

Sediments along the west coastal sector are patchy; near shore they consist of mud, sand, sand and mud, clay, stone, or rock, while in the deeper waters of the central portions of the Black Sea (901), and also in the adjoining gulfs, mud, sand and mud, sand, or sandy clay will usually be found.

Off the south coastal sector mud or sand and mud predominate, with nearshore sediments mostly sandy. There are patches of rock or stone off most of the numerous headlands.

Phosphorescent organisms, such as *Noctiluca*, probably occur in all coastal waters of European U.S.S.R., although there are no records of them from the Baltic Sea (890); they are abundant in the Black Sea (901). No large seaweeds are to be found, although small forms and eelgrass will be encountered on rocks everywhere. Floating tree trunks carried down in the spring freshets will be met with in and off the Beloye More (White Sea) (109).

B. Glossary

The following Russian terms are used in this chapter:

Banka	bank, rock
Bar	bar
Bereg	coast
Bol'shoy, Bol'shaya, Bol'shoye	big
Bukhta	bay, bight
Farvater	fairway
Gavan'	haven, harbor
Gorlo	throat, gullet
Guba	bay, gulf, cove
Kosa	neck, spit
Krasnyy, Krasnaya, Krasnoye	red
Liman	estuary
Ludy	rock above water
Malyy, Malaya, Maloye	small
Mel'	bank
More	sea
Mys	point, cape
Nos	cape, neck
Ostrov, Ostrova	island, islands
Ostrovok	islet
Ozero	lake
Poluostrov	peninsula
Proliv	strait
Reka	river, creek
Reyd	roadstead
Salma	strait, channel
Severnyy, Severnaya, Severnoye	North, northern
Shar	strait, sound
Shkhery	skerries
Stamik	lighthouse
Vorota	channel, passage
Zaliv	gulf, bay
Zemlya	land

31. TIDES AND CURRENTS

A. Tides

(1) North Coastal Sector (FIGURE III-51)

Tides on the Arctic shores of the Soviet Union are important to navigation, and detailed information about them is given in this report.

Throughout the area the tide is semidiurnal at all times. Diurnal equality is relatively small except in Proliv Yugorskiy Shar (23), where a noticeable inequality exists between the heights of morning and afternoon tides at times of tropic tides, particularly in the high waters. The mean range of tide in this strait is only about 1½ feet, however.

There is considerable range of tide from place to place, as shown in FIGURE III-1. FIGURE III-2 shows graphically the relative times of high tide for the area.

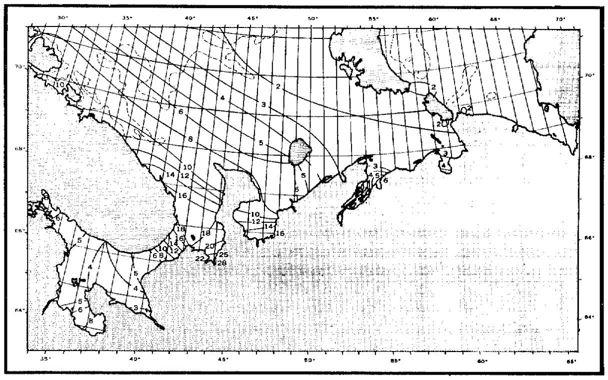


FIGURE III - 1. *North Coastal Sector, range of spring tide.*

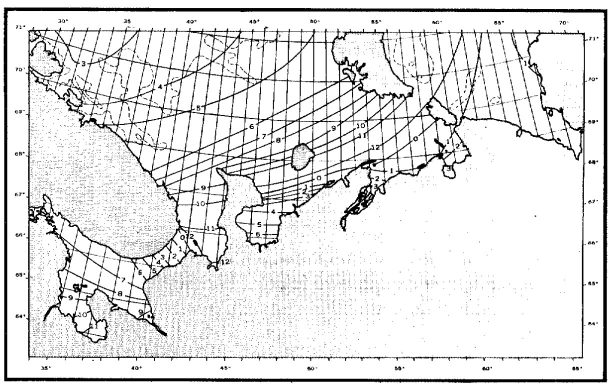


FIGURE III - 2. *North Coastal Sector, cotidal lines of the semi-diurnal tide.*
The lines join points with the same mean high water interval (in hours) after the passage of the moon over the meridian of Greenwich.

A phenomenon known as *manikha* is observed in Dvinskaya Guba (108) during flood. In many parts of this gulf, at about three hours before high water the rise is interrupted and the level either stays constant for a time or may drop somewhat, after which the level continues to rise until high water is reached. The *manikha* sometimes lasts as long as one hour.

(a) Tide predictions.—Characteristic features of tides at selected points in waters of European Russia are presented in TABLE III-5, Tidal Differences and Constants. Tide predictions for places listed can be made by applying their tidal differences to daily predictions for the appropriate reference station. (The locations of all places listed in TABLE III-5 are indicated by reference number on FIGURES III-51 to III-53.) Daily predictions for the reference stations are obtainable from the current volumes of the U.S.S.R. Tide Tables listed in Topic 37. Predictions for Yekaterininskaya Gavan' (335) can also be found in Tide Tables, Atlantic Ocean (U. S. Coast and Geodetic Survey) and for Yekaterininskaya Gavan' (335) and Kem' (176) in Admiralty Tide Tables, Section A.

The example (Topic 31, A, (1), (d)) and FIGURE III-3 demonstrate the method of using the table of tidal differences and constants and also illustrate the use of the typical curves (FIGURE III-4) in obtaining the height of the tide at any time.

(b) Tidal differences

1. TIME.—Time differences are applicable to both high and low water, unless otherwise indicated, and will give predictions for all places in the kind of time indicated in TABLE III-5. It should be noted that standard time of the meridian indicated is used and not "summer time" or daylight saving time. A plus sign (+) means that the tide is later than at the reference station and the difference should be added; a minus sign (—) means that the tide is earlier and the difference should be subtracted.

2. HEIGHT.—The height of the tide, referred to the datum of charts, is obtained by means of a ratio. Multiply the heights of high water and low water at the reference station by the ratio.

(c) Tidal ranges.—The range of tide is the difference in height between consecutive high and low waters. *Mean range* is the average range over a considerable period of time. *Spring range* is the average of the large ranges that occur fortnightly near the times of new and full moon.

The principal variations in range during the month are due primarily to the changing phase and the changing declination of the moon. Thus, the ranges not only become larger and smaller fortnightly, but there are also varying differences during the month between the heights of morning and afternoon tides. The variations can best be seen by scanning the daily predictions for the reference stations and examining the typical curves.

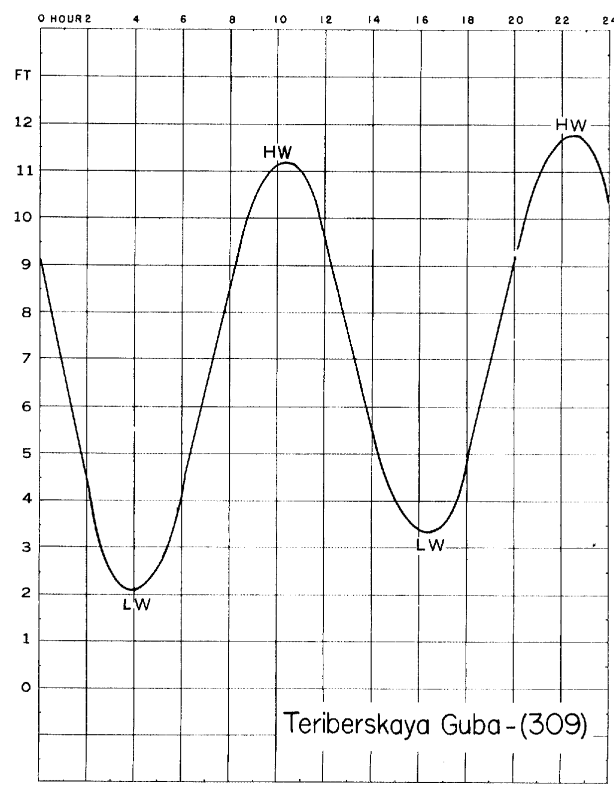


FIGURE III - 3. *Example: Tide curve for Teriberskaya Guba.*

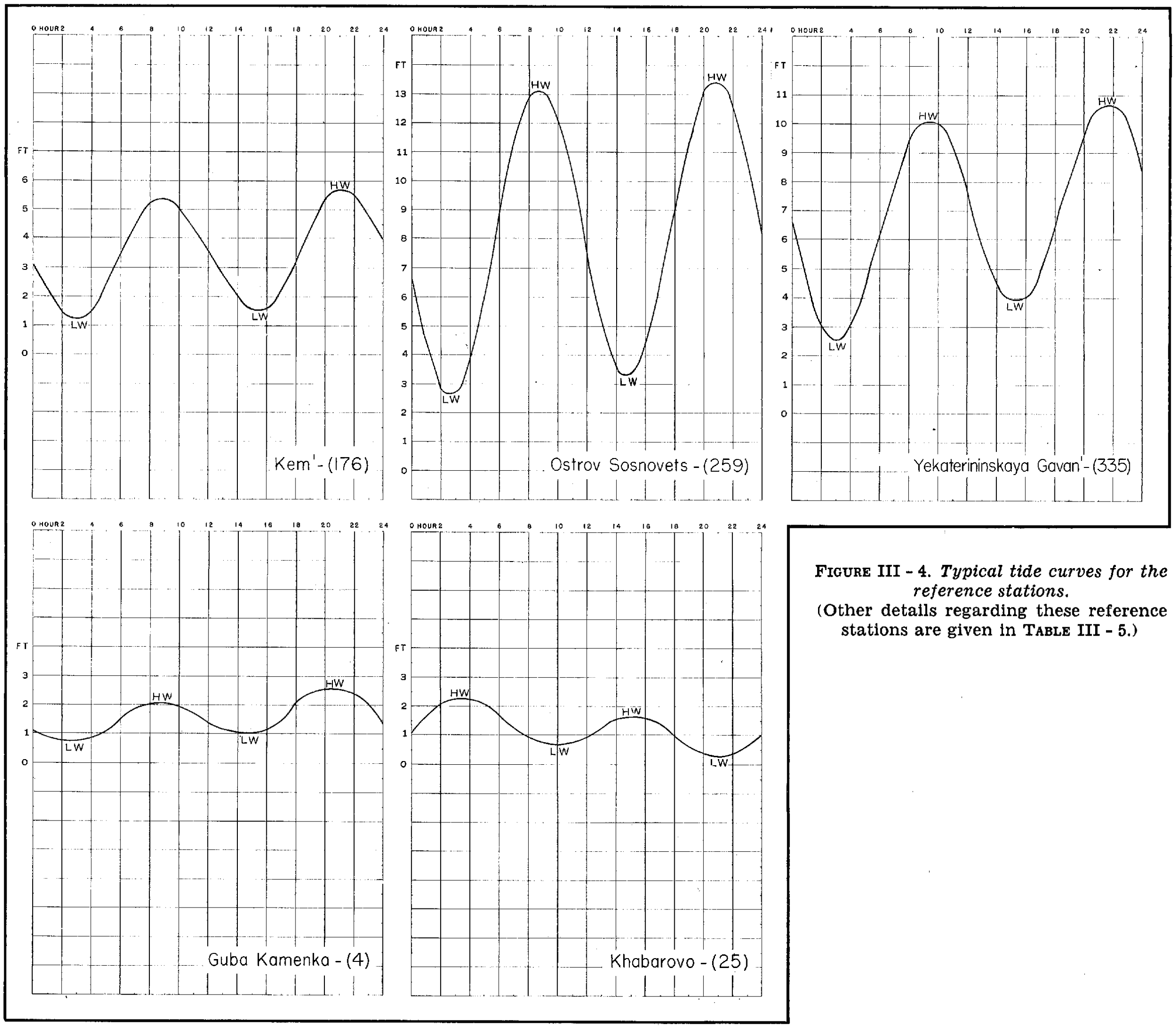


FIGURE III-4. *Typical tide curves for the reference stations.* (Other details regarding these reference stations are given in TABLE III-5.)

Mean sea level (MSL) above chart datum is given in the last column of TABLE III-5. The approximate average levels of the high and low water, at times of spring and average tides, can be obtained from mean sea level by adding and subtracting one-half the corresponding range.

(d) Example (FIGURE III-3).—To find the times and heights of the high and low waters for Guba Teriberskaya (309), on a particular day, and draw a curve which will show the height at any time during that day.

According to TABLE III-5, predictions are obtained for Guba Teriberskaya (309) in 30° E meridian time by applying a time difference and a height ratio to daily predictions for Yekaterininskaya Gavan' (335). TABLE III-1 illustrates the method of prediction, assuming the predictions for Yekaterininskaya Gavan' for the day in question to be as shown.

The resulting times and heights are plotted on cross-section paper (FIGURE III-3); these points are then connected by a curve similar in shape to the typical curve for places referred to Yekaterininskaya Gavan' (335) (FIGURE III-4).

From this curve for Guba Teriberskaya (309) one can then determine the height of the tide at any time during the day, the duration of stand at high and low water, etc.

(2) West Coastal Sector (FIGURE III-52)

The periodic tide has a range of less than four inches

TABLE III-1

EXAMPLE: CALCULATION OF TIDAL PREDICTIONS

	Low Water			High Water			Low Water			High Water		
	h.	m.	ft.	h.	m.	ft.	h.	m.	ft.	h.	m.	ft.
Yekaterininskaya Gavan' (335) predictions	3	43	2.0	10	02	10.8	15	55	3.3	22	07	11.3
Time difference for Guba Teriberskaya (add)	+0	20	..	+0	20	...	+0	20	...	+0	20	....
Height ratio for Guba Teriberskaya (multiply)	..	..	1.04	..	..	1.04	..	..	1.04	..	..	1.04
Resulting predictions for Guba Teriberskaya (309)	4	03	2.1	10	22	11.2	16	15	3.4	22	27	11.8

for all places bordering on the Baltic Sea (890). It can be completely ignored, as this small tide is entirely masked by larger seasonal variations in sea level brought about by warming and cooling and variation in the amount of water supplied by rivers, and by short-period variations caused by strong winds and atmospheric pressure fluctuations. These factors may combine to raise or lower the water of the Baltic Sea (890) about 3 feet from the mean water level and even as much as 5 feet at the head of inlets; at Kronshtadt (813) the extreme range of water level observed in a period of 35 consecutive years is 13¼ feet.

Usually there is high water on the coast toward which the wind blows and low water on the opposite coast; appreciable local changes from this rule can be caused by irregularities in the shape of the coast, such as large bays or reefs. Very severe gales, though they occur rarely, may cause an accumulation of water resulting in great floods in some localities, while in other places shoals that are usually covered by several feet of water become dry.

The effect of atmospheric pressure on the water level is weaker than that of the wind, but it is local and is felt more quickly. This effect occurs more frequently in autumn and winter; it sometimes lasts for weeks though more commonly for a few days over a certain area.

In general, changes in water level will be greater in bays and narrow waters than on the open coast where there are no great obstructions to water movements. The changes are relatively smaller during the summer months, probably because storms seldom occur at this time of year.

Detailed information on the fluctuations in water level at many places will be found in Sailing Directions for the Baltic (Hydrographic Office Publication No. 143).

(3) South Coastal Sector (FIGURE III-53)

The periodic tide in the Black Sea (901) is very small (3 inches or less) and is completely masked by the much larger variations in level due to variations in wind, atmospheric pressure, and river discharge. There is a regular fluctuation throughout the year of 20 to 60 inches, the level rising rapidly in the spring to a maximum in May, June, or July and falling quickly to the minimum level in October or November. Larger variations sometimes occur at certain places, depending upon the wind and season. A study of numerous sources indicates that the detailed data on pages 35 to 37 in the British Admiralty Black Sea Pilot, 9th Edition (1942), cover the situation adequately; therefore, that book should be consulted.

B. General circulation

(1) North Coastal Sector

The permanent current system in this region is indicated in FIGURE III-5. The most important component of the system is the current setting southeasterly off the Murmanskiy Bereg (Murman Coast (311)), which is an extension of the Gulf Stream, and carries relatively warm water into the region. To the east of Novaya Zemlya (2) a southerly setting current brings cold arctic water into the region to the south. The velocity of these permanent currents is generally one-half to two-thirds of a knot. Winds blowing in the same direction will increase the current velocity to one knot or more, and contrary winds will have a retarding effect.

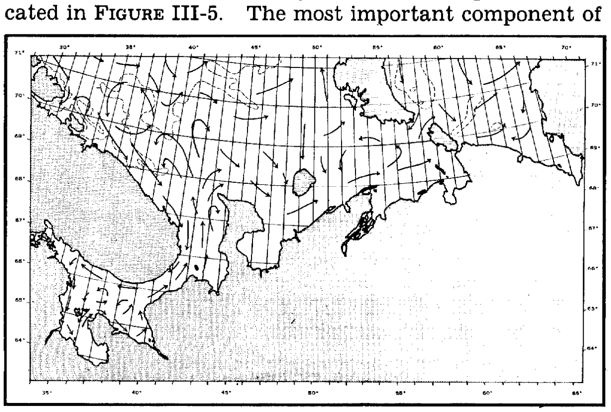


FIGURE III - 5. *North Coastal Sector, average annual currents.*

(2) West Coastal Sector

Permanent currents in this region are related to the discharge of the many rivers that flow into the Baltic Sea (890). There is a general slow southward and westward surface flow out of this sea, while a subsurface current of relatively saline water from the North Sea sets along the south and east shores and can be traced as far as Saaremaa (856).

(3) South Coastal Sector

FIGURE III-6 shows the permanent currents of the Black Sea (901). The system is somewhat weak and irregular and may be modified by changing winds and variations in river discharge. The currents are usually stronger and more stable during periods of large river flow than when the rivers are low. Wind effects are relatively important when drainage currents are weak.

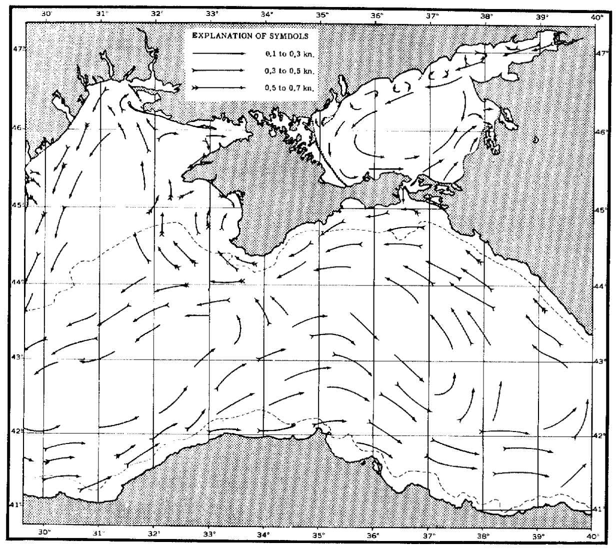


FIGURE III - 6. *South Coastal Sector, average annual currents.*

C. Notable local peculiarities

(1) North Coastal Sector

The most characteristic nontidal current phenomenon in this area is the spring freshet associated with breakup of the river ice. At this time, the level of the rivers near their mouths may rise as much as 15 feet, sending large quantities of fresh water to sea during ebb, while current velocities up to 8 knots occur at the river mouths.

The tidal currents in this area are semidiurnal in character with some diurnal inequality in most localities. Detailed information is given in TABLES III-6 to III-8.

Further detailed tidal current data can be found in the publications listed in Topic 37.

The drift of ice in this region is described in Topic 33, A, (2), (d).

(2) West Coastal Sector

The currents in this region are nontidal.

Currents caused by winds attain velocities of one to two knots in the open sea and three to four knots near shore during gales. They usually set with the wind but may set at any angle to it, even directly to windward. Such currents result from the effects of winds blowing at previous times or in places other than those at which the currents exist.

Gulf of Finland (801). The currents usually run out of the Gulf of Finland (801), but during westerly and southwesterly winds they flow eastward parallel to its shores, sometimes with a velocity of 1½ knots. With westerly gales a strong current runs into Nevskaya Guba (812), south of Kronshtadt (813), and out on the north side, continuing along that shore with considerable velocity toward Seyvyaste (Seivästö) (809). When the westerly wind ceases a westward current begins and sometimes continues for several days. During northerly winds the current flows into the bays on the southern side of the Gulf of Finland (801).

As the water level of Ladozhskoye Ozero (Ladoga Lake) is 14 feet higher than that of the Gulf of Finland (801) at Kronshtadt (813), a current of 1¾ knots often occurs in the Neva where it flows through Leningrad (811) harbor. During northerly winds the velocity may increase to 3 knots.

In Kronshtadt (813) Roads the current sets westward during easterly winds with a velocity of from ½ to 1½ knots. After westerly winds cease, the water which has been piled up near Leningrad (811) flows out at a velocity of 3 knots at times.

Passages between Gulf of Finland (801) and Gulf of Riga (866). Off the northern entrance to Hari Kurk (842), the current during calm weather sets west-northwestward with a velocity of ¼ knot. This increases to one knot with northerly winds.

In Voosi Kurk (841) there is either a southward or northward current in calm weather. Strong southwest winds may cause northward currents of 3 knots, and northwest winds a southward current of one or more knots.

As a general rule, with continuing winds from southwest to west, the current sets from the Gulf of Riga (866) and the Baltic (890), through Soela Väin (849), across Kassaare Laht (850) and through Muhu Väin (853), and Hari Kurk (842) into the Gulf of Finland (801). The current is reversed during winds from the north, northeast, and east.

In Muhu Väin (853) during south and southwest winds, there is a northerly current of 1½ knots which becomes weaker as it continues northward.

In Soela Väin (849), a current is always noticeable in calm weather. Northerly or southerly winds cause a strong westward current and strong southwesterly or northwesterly winds produce an eastward flow. The velocity may reach 4 knots in the narrows and 1½ knots in Kassaare Laht (850).

Gulf of Riga (866). In the roads and on the bar of the Daugava (864) there is a southeastward current of ¼ knot or less during west and northwest winds, and a northwesterly current of up to one knot during east winds. In the Daugava (864) the velocity is from ½ to 2 knots. In the spring when the river ice breaks there is a northwest current of 3 knots across the bar for about 2 weeks. This velocity decreases gradually until June.

Currents often enter the Gulf of Riga (866) from the Gulf of Finland (801) through Muhu Väin (853) or from the Baltic (890) through Irbeni Väin (873). Between Ruhnu (867) and the mainland the current from Muhu Väin (853) is usually ½ to ¾ knot. The current from the Baltic Sea (890) is very strong with southwest and west winds, and sets across to the eastern shore of the gulf whence it is diverted in a northwesterly direction toward Muhu Väin (853) with a velocity of one to 1½ knots. When the wind subsides the water flows back into the Baltic Sea (890). The current on the western side of the southern part of the gulf depends upon the wind and attains velocities of ½ to 1 knot.

Ventspils (876). The current always sets northward or southward along the coast off Ventspils (876) and may reach a velocity of 2 knots. In the lower part of Ventspils (876) harbor there is a 2¼-knot current.

Liepāja (878). The current off Liepāja (878) sets parallel to the coast and directly across the dredged entrance channel with velocities up to 2 knots. Its velocity and direction depend upon the wind. The largest velocities set northward.

Klaipėda (880). Across the entrance to Zeyetif (881) the prevailing coast current sets northward, at times attaining a velocity of 2 knots. Northerly winds cause a southerly current. In Zeyetif (881) the current usually sets outward when the coast current is setting northward and inward with a southerly coast current. The current may attain a velocity of 3 knots during the spring months.

Mys Bryusterort (Brüster Ort) (884). At Mys Bryusterort (884) the current velocity reaches 2 knots or more. North of Mys Bryusterort (884) it flows mainly westward, and south of Mys Bryusterort (884) it sets north or south according to the wind.

Frische Nehrung (886). During gales from south-southwestward to west-northwestward the current runs to the northward along the Frische Nehrung (886) and uniting with the current setting out of the Frisches Haff (888) generally turns several times on the same day and is influenced by the velocity and direction of the wind.

(3) South Coastal Sector

The currents in this region are also nontidal.

Between the Danube (902) and Dnepr (917) Rivers. The current from the latter combined with the general counterclockwise flow sets southward to the Danube delta (902) with a velocity which is usually from ½ to ¾ knot. Joined by the flow from the Danube (902) it continues south-southwestward with increased width but diminished velocity.

Between the Dnepr (917) river and Azovskoye More (945). Counterclockwise flow of the Black Sea (901) sets westward along the coast from Kerchenskiy Proliv (938) to Mys Sarych (933). Westward of Mys Sarych (933) it turns northward continuing in that general direction to about the latitude of Odessa (905) and forming clockwise eddies in Kalamitskiy Zaliv (929) and Karkinitskiy Zaliv (925). Where the current turns northward a branch having a velocity of ¼ to ½ knot sets approximately west-southwest joining the current that sets southward along the western shore of the sea.

The main current that sets approximately parallel to the coast between the Dnepr (917) river and Kerchenskiy Proliv (938) usually has a velocity of from ¼ to ¾ knot. Off Mys Tarkhankut (927) the velocity may reach 2 knots at times.

In Kerchenskiy Proliv (938) the southward flow predominates. It is especially strong during the spring months. In autumn when the rivers are low the current at times sets northward. The current in the strait depends to a considerable extent upon the wind. During

strong northeasterly winds it may attain a velocity of 5 knots in the narrows.

In the Azovskoye More (945) the current usually flows in a counterclockwise direction along the shore. Its average velocity is reported to be ½ knot or less. It is accompanied by eddies within the bays that indent the coast line. As elsewhere in the Black Sea area the current depends to a great extent upon the wind.

At Genichesk (947), where the channel connects Azovskoye More (945) with Sivash More (946), currents carried by winds may attain a velocity of 5 knots.

In the Taganrogskiy Zaliv (956) the prevailing direction of the current is westward, but the wind frequently causes it to set eastward, particularly when the Don River (960) is low. The velocity is usually from ¼ to ½ knot, but strong winds may increase it to 1½ knots. When the wind ceases a reverse current flows until the water level is restored.

32. SEA AND SWELL

A. General

The condition of the surface of the ocean is described by the terms *sea* and *swell*. *Sea* refers to waves caused by the local wind, whereas *swell* refers to waves that have progressed beyond the influence of the generating winds. The direction of the *sea* is that of the local wind, whereas the direction from which *swell* comes is independent of the local wind but may occasionally coincide with it. It frequently happens that both *sea* and *swell* are present at the same time.

A knowledge of sea and swell conditions is desirable in planning operations utilizing aircraft carriers and motor torpedo boats, as well as in those requiring the transfer of personnel and heavy equipment from large to small vessels and landing craft. This information will also lead to a more accurate estimate of the effectiveness of sonar equipment; a rough sea will cause a high background noise level, and variation in the stratification of the water layers which may produce differences in the ranges obtained by sonar equipment, as described more fully in Topic 33, D. The efficiency of airborne radar search for submarines depends to some extent upon wave conditions, as does the efficiency of "schnorkeling" equipment used by submarines.

Although the surface of the ocean is not a series of rhythmic waves, it is possible to observe the height, length, and period of the more conspicuous waves making up the sea and the swell. Quantitative values for these characteristics have been established as functions of the velocity, fetch (the distance which the wind has blown over water), and duration of the wind, and distance through which the swell has decayed. FIGURES III-7 and III-8 present these relationships for the generation of significant waves, i.e., those waves having the average height and period of the highest one-third of the waves present during a given time. If waves enter strong following or opposing currents, whether permanent or periodic, the still-water wave form may undergo considerable change. If the waves are moving against a component of the current, the waves shorten in length and increase in height, and the wave form steepens even to the point of breaking, as in tide rips; if the waves are moving with a component of the current, the waves increase in length and decrease in height, and the form flattens. The probable change in height can be found from FIGURE III-9. Waves moving through belts of pack ice decrease appreciably in steepness and in height.

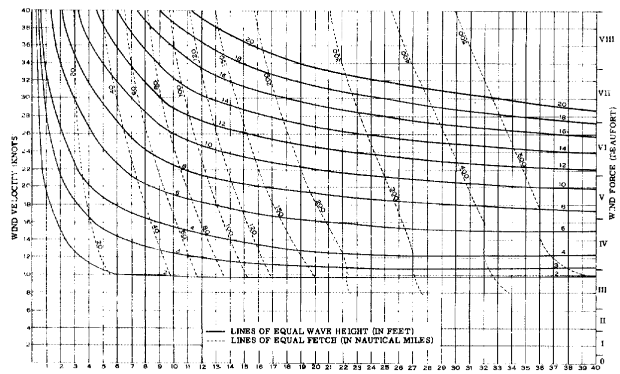


FIGURE III - 7. *Wave generation diagram, height.*

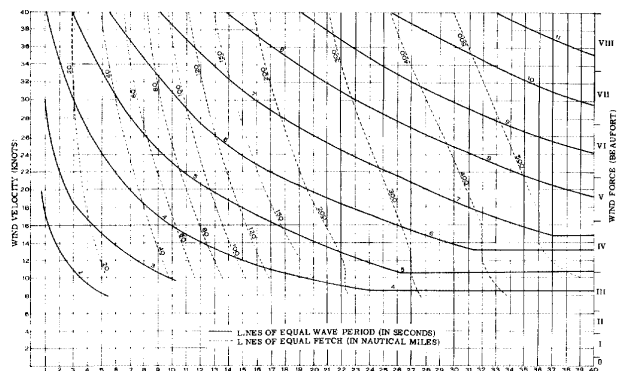


FIGURE III - 8. *Wave generation diagram, period.*

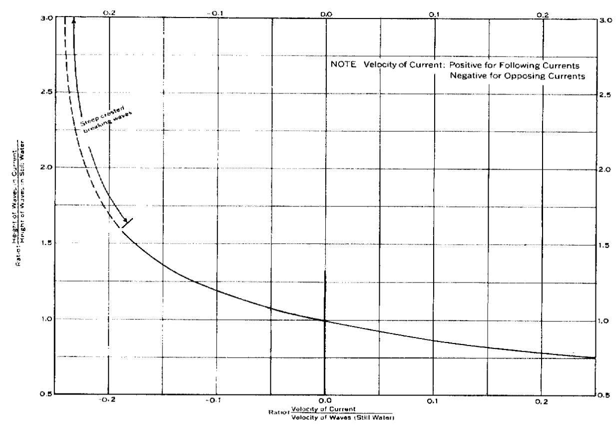
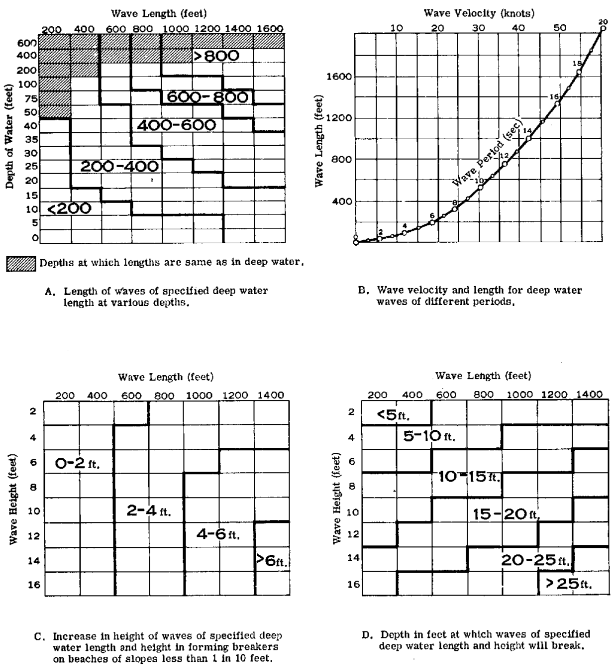


FIGURE III - 9. *Change of wave height in an opposing or following current.*
Depth greater than one-fifth of the wave length in still water.

Surf conditions are not only directly related to sea and swell conditions offshore but are also affected by bottom topography, the configuration of the coast, and strong currents which, if they oppose the waves, act as temporary but quite effective breakwaters. When the shore is exposed to swell, breakers will usually be higher than the waves offshore. A satisfactory method for forecasting surf has been developed. With this technique, a team composed of a photographic unit, a photo-interpreter, and an aerologist trained in the use of H. O. Publication 234, Breakers and Surf; Principles in Forecasting, can make operational forecasts for selected beach areas. However,

because of the time required to prepare such forecasts for a single beach, it is impractical to prepare them for areas as large as those covered by this report.

While it is not feasible to compute the probable occurrence of various surf conditions for specific areas, considerable information relating to the character of the surf along the coasts is presented in FIGURE III-10. This figure shows the characteristics of deep water waves and the changes they undergo as they enter shallow water and form breakers. From the four graphs in this figure, it is possible to determine: 1) The changes in length of waves of specified deep water length as they approach the shore (FIGURE III-10A). (At the moment of breaking, the waves may be slightly longer than the values determined from this graph.) 2) The relationship of wave period and velocity to waves of specified deep water length (FIGURE III-10B). 3) The increase in height of waves of specified



A. Length of waves of specified deep water length at various depths.

B. Wave velocity and length for deep water waves of different periods.

C. Increase in height of waves of specified deep water length and height in forming breakers on beaches of slopes less than 1 in 10 feet.

D. Depth in feet at which waves of specified deep water length and height will break.

FIGURE III - 10. *Characteristics of deep water waves and the changes they undergo as they approach the shore.*

deep water height and length in forming breakers on beaches of slopes of less than 1 in 10 (FIGURE III-10C). 4) The approximate depth at which these waves will break (FIGURE III-10D).

The following generalizations apply to conditions not covered by FIGURE III-10: 1) If the underwater slope in front of the beach is gentle (less than 1 in 50) and the waves in deep water are short (less than 250 feet in length), the height of the breakers on an open beach will be about equal to the height of the wave in deep water. 2) If the underwater slope is steep (more than 1 in 10) or the waves in deep water are long (600 feet or more in length), the height of the highest breakers on an open beach that faces the direction of the swell will be about twice the height of the wave in deep water. 3) If the wave crests in deep water are at an angle of more than 70° to the shore line, the breakers will be lower in height than the waves offshore because of refraction. 4) Where the surf approaches the beach at an angle, there will be a current flowing parallel to the shore away from the direction of the approaching waves. This current must be considered in landing operations because it is a factor in causing boats to broach.

B. Amount of sea and swell

Because of extremely irregular coast lines often protected by islands or peninsulas, variable currents, and a scarcity of sea and swell observations, the percentage frequency of the occurrence of various wind wave conditions at almost all coastal localities must be computed from wind data; limiting factors, such as fetch or strong tidal currents, must also be taken into account. TABLE III-2 lists the wave characteristics found under varying wind forces for the most frequent fetches — those 50 to 100 miles in length. Durations are assumed to be always greater than 6 hours.

Empirical information on the occurrence of swell is also lacking; if the frequency of occurrence is desired for a given locality, it must be computed from a series of past weather maps. Actually, there are but few occasions in protected waters during which troublesome swell will occur without equally troublesome seas. Storms severe enough to generate such swell are generally of such extent as to generate wind waves of equal or greater height in the area of interest within a few hours following the onset of the swell. Localities with a limited fetch are exceptions.

TABLES III-9 to III-11 list the available sea, swell, and wind data for the areas and stations shown in FIGURE III-11, while TABLE III-12 presents information pertinent to specific localities and anchorages. Since certain years are exceptionally ice-free, wind data are given for all months of the year.

C. Sea and swell in specific areas

(1) North Coastal Sector

Because of the existence of short fetches and strong tidal currents, wind waves found in the protected waters of this sector are likely to prove more troublesome to small craft than waves occurring in the open sea, even though the latter are of the same height or generated by the same force of wind.

Seas are relatively calm during the summer (May to August). For the stations west of Ostrov Vaygach (27), summer is a period of light and variable winds, the frequency of forces under Beaufort 4 being 40% to 75% and

TABLE III - 2

ESTIMATES OF WAVE CHARACTERISTICS BASED ON WIND DATA
(Fetch, 50 to 100 miles; duration, greater than 6 hours)

Wave characteristics	Wind Force (Beaufort)							
	Calm	1-3	4	5	6	7	8	>8
Height (feet)	0	<3	2-5	4-8	6-11	9-15	11-18	>14
Period (seconds)	0	<4	3-5	4-6	5-6	5-7	6-8	>6
Length (feet)	0	<100	<150	<200	<200	<250	<300	>200

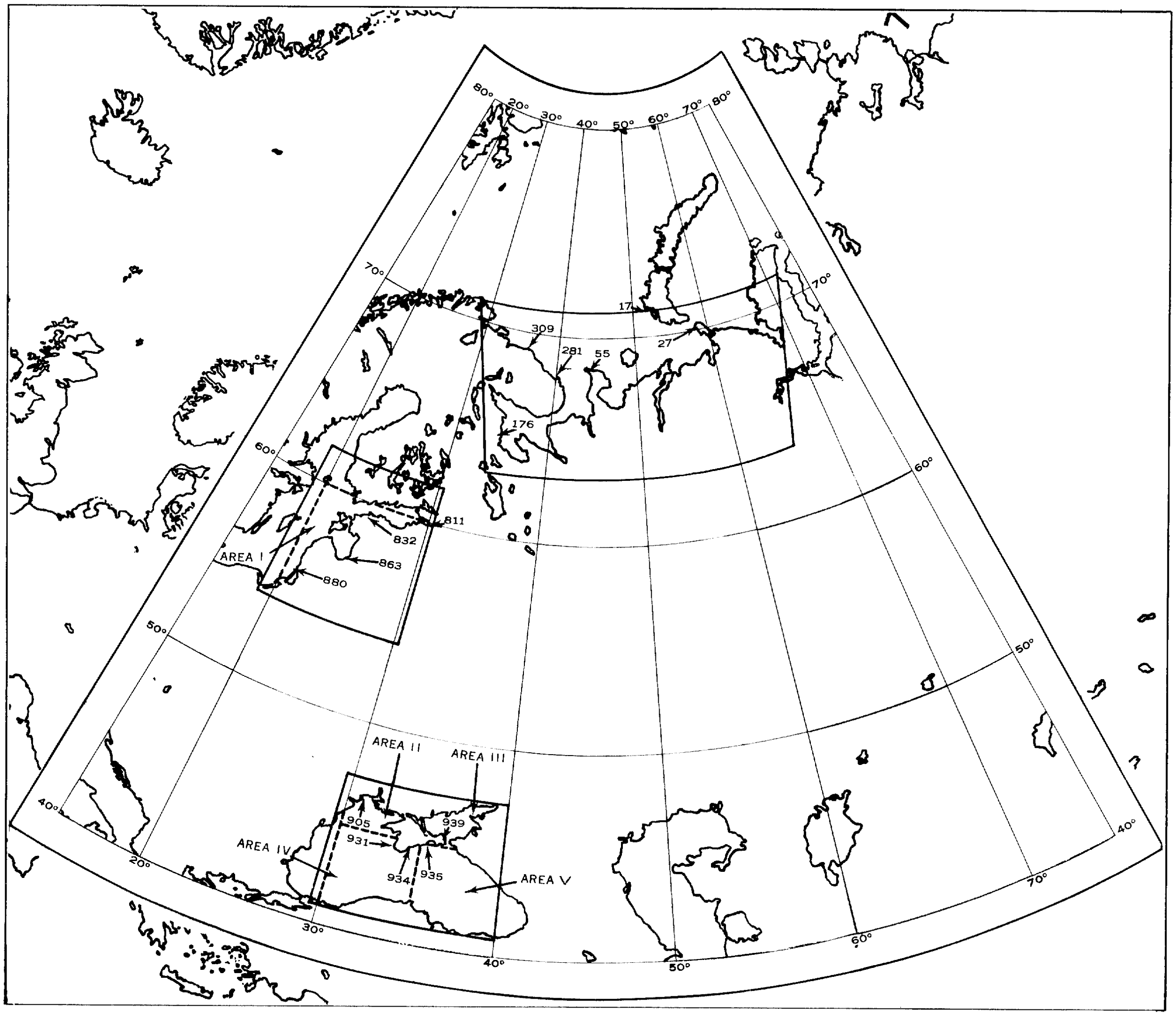


FIGURE III - 11. *Index to swell or wind areas and to stations observing sea state or wind conditions.*

that of forces above Beaufort 6 being 1% to 10%. The Proliv Karskiye Vorota (6) is somewhat windier than this, probably because of the funneling effect between Ostrov Vaygach (27) and Novaya Zemlya (2). Sea breezes which develop along the Beloye More (109) coast are likely to cause a late afternoon increase in wave height of one to two feet close to shore.

Sea conditions are somewhat worse during the winter months (November to March), winds less than Force 4 occurring 25% to 75% of the time, and winds above Force 6 from 1% to 22%. Spring and autumn months are generally transitional in character.

Cold, squally winds termed *boras* sometimes blow violently seaward from the coasts of Novaya Zemlya (2), particularly off the valleys. These winds raise steep, choppy waves up to 10 feet in height for as much as 20 miles off the coast. They often persist for 24 hours and have lasted for several days. Observations taken during a single navigational season give the following frequencies of occurrence: June, 2.9%; July, 6.1%; August, 4.5%; September, 3.7%; and October, 3.7%. The maximum frequency is during the spring, when the *bora* occurs as much as 10% of the time.

(2) West Coastal Sector

Seas are predominantly low during the summer months (May-August), winds less than Force 4 occurring from 40% to 75% of the time. Sea observations at Klaipėda (880) verify this conclusion, the frequency of slight seas or less being from 59% to 73% and rough or higher seas 9% to 19%. Very favorable conditions are found in the head of the Gulf of Finland (801) where winds greater than Force 5 occur in only 2% to 4% of the observations, and winds of Force 3 or less occur in 66% to 80% of them. Pronounced land and sea breezes are likely to occur, with the strong onshore breeze appearing in the late afternoon and temporarily raising wave heights one to three feet.

At Klaipėda (880), the frequent storms of winter (November to February) double or triple the incidence of rough seas or worse over that of the summer months. The frequency of winds greater than Force 5 ranges from 3% to 17% during this period. Interestingly enough, the frequency of light winds below Force 4, and hence the frequency of seas below 3 feet in height, remains almost as high as during the summer, ranging from 32% to 81%. Spring and autumn months have conditions quite similar to those of winter. Even during these stormy months,

the head of the Gulf of Finland (801) remains relatively calm, reporting winds greater than Force 5 in but 3% to 11% of the observations.

From the few observations available for the months July to September, it is apparent that moderate swell is not uncommon in the summer, being reported in about a third of the observations. If such conditions are characteristic of summer, it should be expected that the total frequency of moderate and high swell will be appreciably higher than the above value during the stormier months.

(3) South Coastal Sector

At the coastal stations, seas moderate or lower are most frequent from June through August, when they occur on about 70% to 85% of the occasions; they are least frequent between November and March when they occur 40% to 60% of the time. High seas (rough or higher) are most frequent between November and March, occurring on 20% to 40% of the occasions; in the summer, such seas only occur 3% to 13% of the time. The months April, May, September, and October are transitional months.

Sea breezes during the summer will be effective in temporarily raising the wave heights near shore one to three feet in the late afternoon. Waves are likely to be particularly steep in the severe squalls associated with cold fronts sweeping over the water and along the northwest shore, where waves generated by strong south and southeast winds oppose the flow of river water. This latter effect is particularly pronounced during the spring months.

Information on swell is lacking but, as has been stated earlier, a severe sea is likely to arise a short time after swell becomes so high as to limit operations.

D. Direction of sea and swell

(1) North Coastal Sector

As the direction of sea coincides with that of the wind, a direct conversion is possible from tabulations of wind directions (TABLE III-11). Generally speaking, during the winter months and into April, winds are predominantly offshore along most of the Barents Sea (1) coast, that is, from the east and south in the east portion, and from the southwest to west in the west portion. During the summer, directions are variable, with winds from the northerly quadrant most frequent.

Information on swell direction is not available.

(2) West Coastal Sector

Direct conversion from the tabulation of wind directions indicates that the prevailing seas come from the westerly quadrant during the summer months and, except for the Gulf of Riga (866), from the western half of the compass during the remaining months of the year. Wind directions in the Gulf of Riga (866) appear to be predominantly from the southerly quadrant during the latter period.

TABLE III-10 indicates that two-thirds or more of the swell observed between July and September comes from the western half of the compass. This condition may be expected to continue through the other months for which data are not available.

(3) South Coastal Sector

The prevailing direction of sea, converted from wind data, is from between northwest and east from December through February; during the months March to May, the direction veers to one with a southerly component. During June through August, winds are relatively light, and the seas are variable in direction, being affected to some extent by the sea breezes near shore. From September through November, the seas are again commonly from between northwest and east.

The only information available on the direction of swell is that it often comes from the east and northeast during the winter months.

33. SEA WATER

A. Temperature

(1) Horizontal distribution at surface; ice

Monthly ice conditions and surface temperatures are given in FIGURES III-12 to III-23 for the three coastal sectors under consideration. It should be emphasized that these are climatological averages and are subject to large variations from year to year. A summary of the monthly limits of advancing and retreating ice is given in Chapter V, FIGURES V-4 and V-5.

TABLE III-13 gives data on ice conditions at specific ports and other points on the three coasts.

(2) Sea ice

(a) Formation of ice.—The formation of ice is determined by the freezing point of sea water, which in turn is a function of the salinity of the water (TABLE III-3). Surface salinities for the areas covered by this report are given in Topic 33, B, (1). The initial rate of formation of ice in the sea, as compared with fresh water bodies, may be slowed down by the density relationships involved. Pure water has its temperature of maximum density at 39.2° F. Below this temperature thermal convection currents will not develop, and therefore only the superficial layers need be cooled to the freezing point in order for a layer of ice to be formed. Brackish water with a salinity of 10 parts per thousand attains maximum density at 35.4° F., so that a whole body of water of this salinity must be cooled to this temperature before density currents cease. At a salinity of 24.70 parts per thousand, freezing point and temperature of density maximum are the same, 29.61° F.

In sea water of salinity greater than 24.70 parts per thousand, therefore, convection currents still can exist at the freezing point, and the rate of freezing will be less than for fresh water.

Once freezing has commenced the thickness of ice formed can be estimated from the prevailing air temperatures by FIGURE III-24. This graph can also be used to estimate the rate at which cracks and other openings in the ice will be sealed.

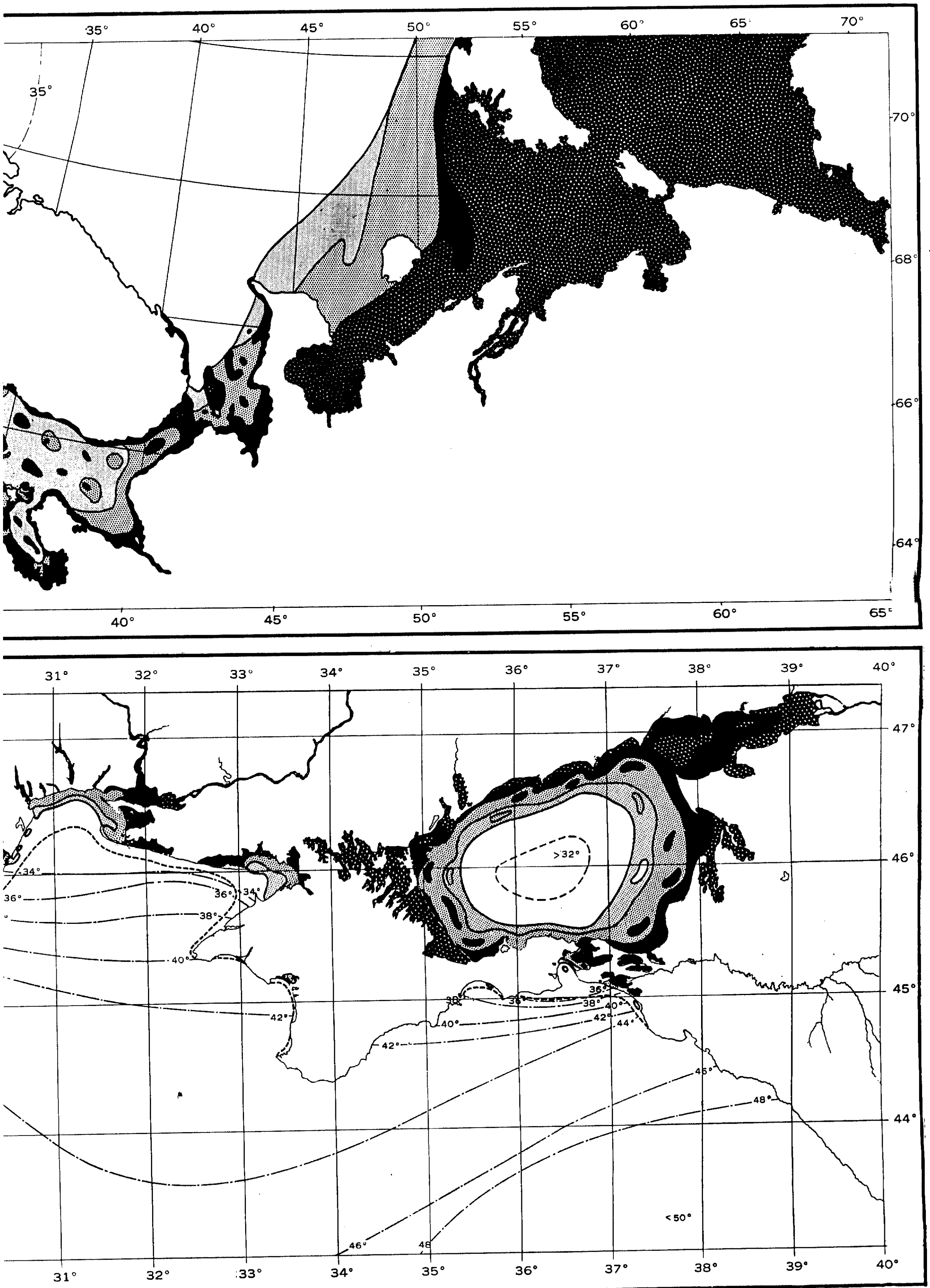
FIGURE III-25 shows typical observations on the annual increase and decrease of ice thickness in high latitudes, and the curves for lower latitudes will be similar in shape.

TABLE III - 3

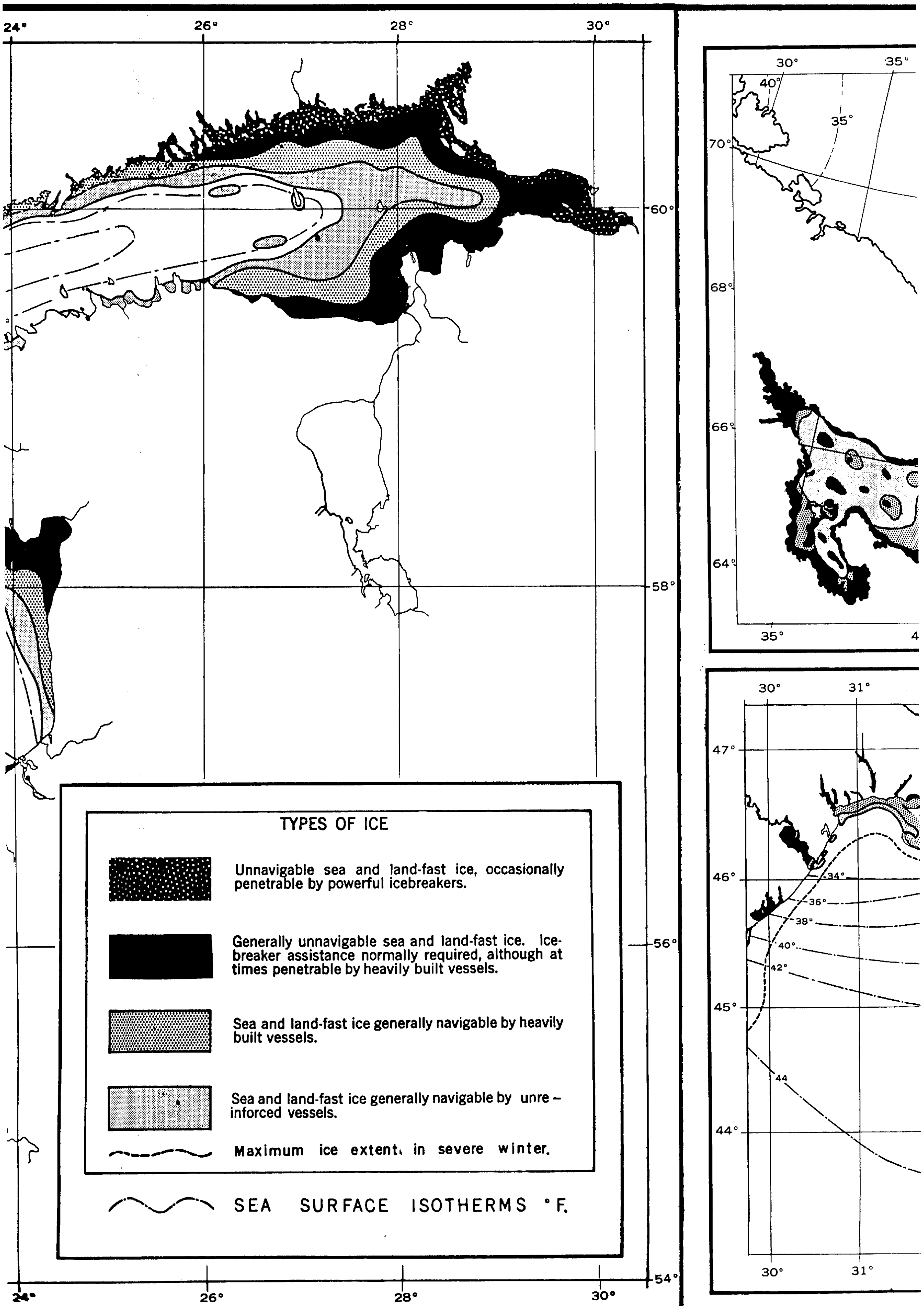
SALINITY, FREEZING POINT, AND TEMPERATURE OF MAXIMUM DENSITY OF SEA WATER

Salinity (parts per thousand)	0	5	10	15	20	25	30	35	40
Freezing point (°F.)	32.0	31.5	31.1	30.6	30.0	29.6	29.1	28.6	28.0
Temperature of maximum density (°F.)	39.2	37.2	35.4	33.4	31.5	29.5	27.5	25.7	23.9

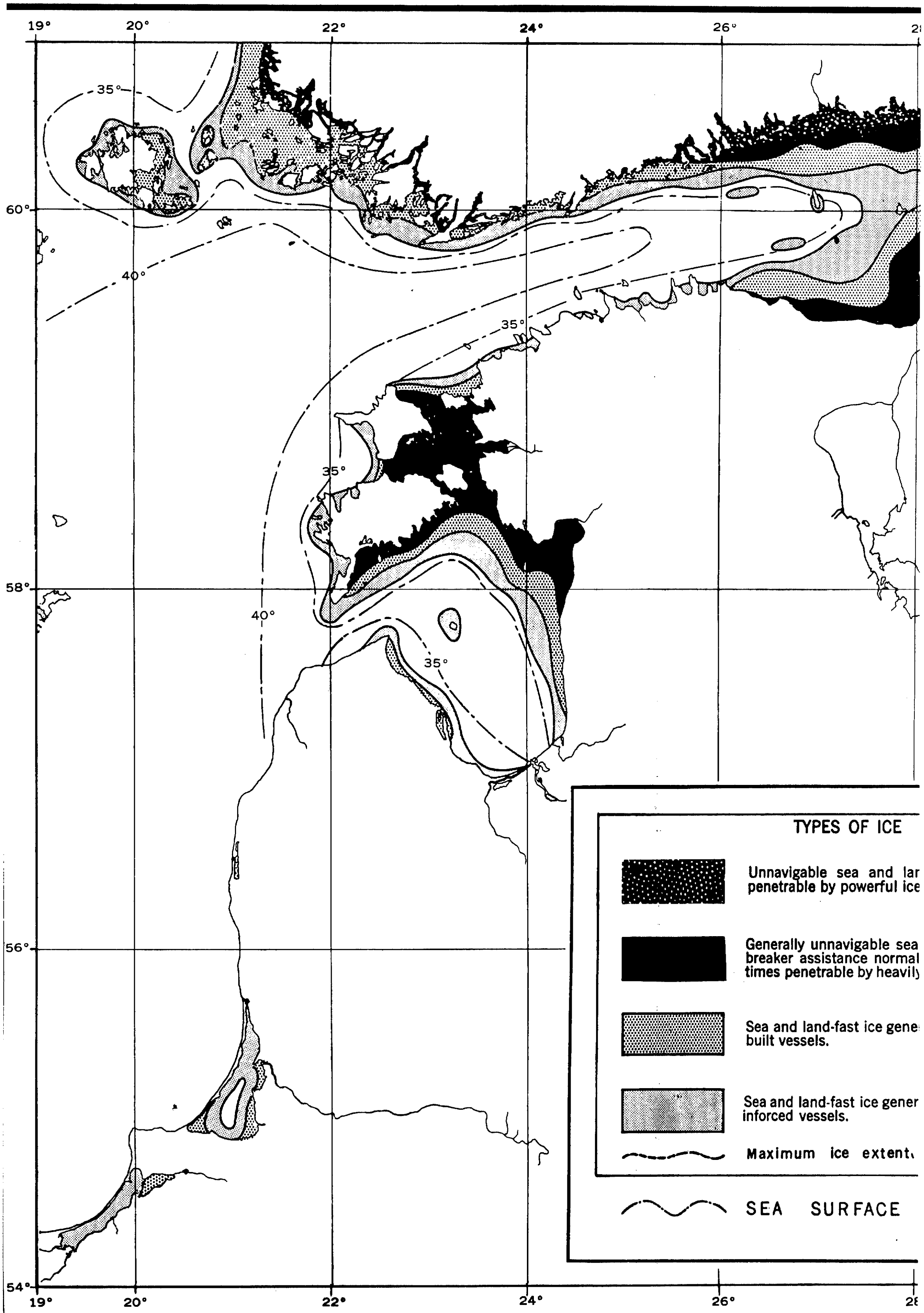
FIGURE III-12
SEA SURFACE TEMPERATURE AND ICE, JANUARY
JANIS 40
[redacted]



2


24°
26°
28°
30°
60°
58°
56°
54°
30°
35°
40°
70°
68°
66°
64°
31°
47°
46°
45°
44°
34°
36°
38°
40°
42°
44
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.

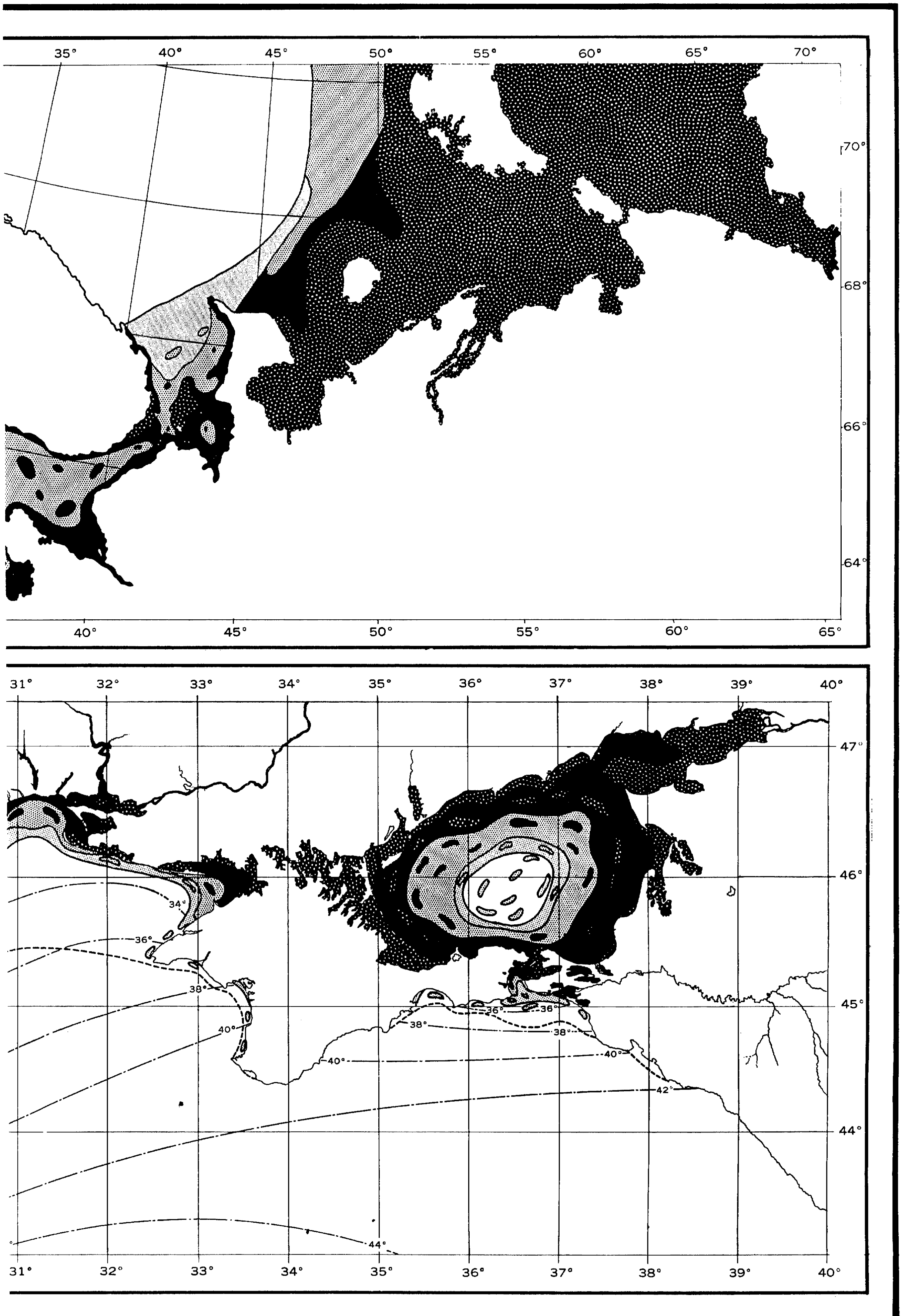
3



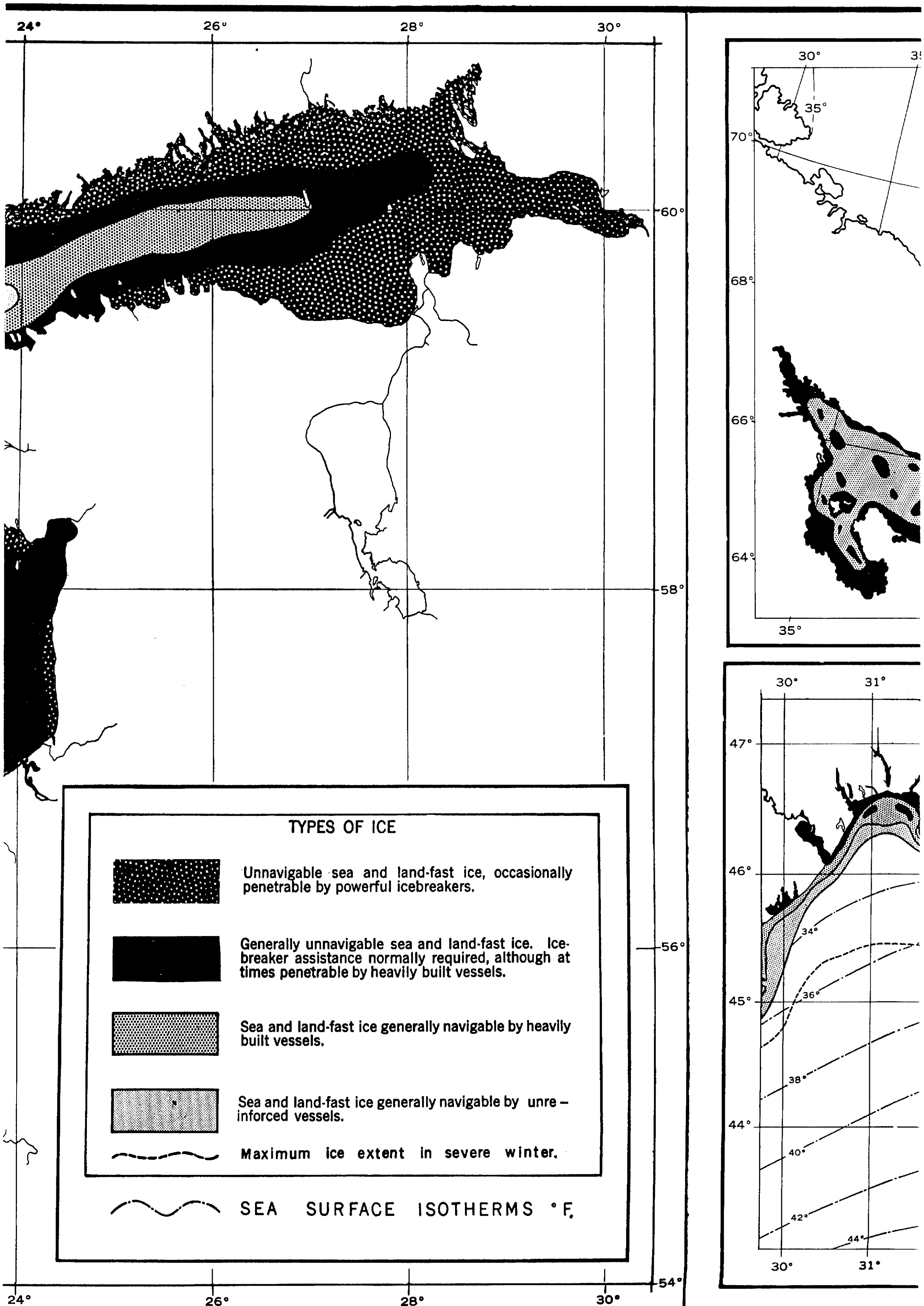
19°
20°
22°
24°
26°
60°
58°
56°
54°
35°
40°
TYPES OF ICE
Unnavigable sea and lar
penetrable by powerful ice
Generally unnavigable sea
breaker assistance normal
times penetrable by heavil
Sea and land-fast ice gene
built vessels.
Sea and land-fast ice gener
inforced vessels.
Maximum ice extent
SEA SURFACE

FIGURE III-13
SEA SURFACE TEMPERATURE AND ICE, FEBRUARY
JANIS 40
[redacted]

(7)



(2)


24°
26°
28°
30°
60°
58°
56°
54°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Icebreaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unreinforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
70°
68°
66°
64°
35°
31°
47°
46°
45°
44°
34°
36°
38°
40°
42°
44°

(3)

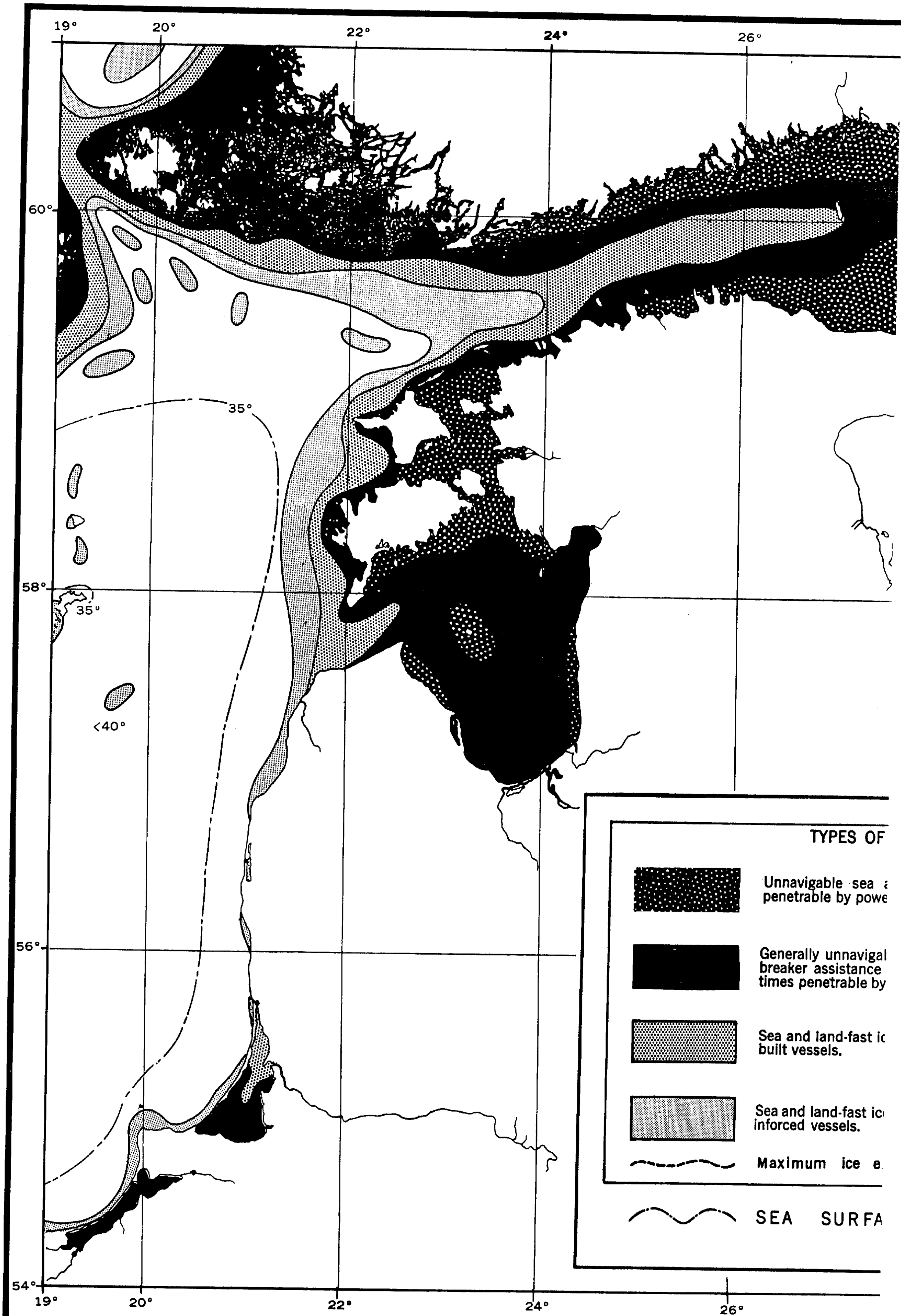
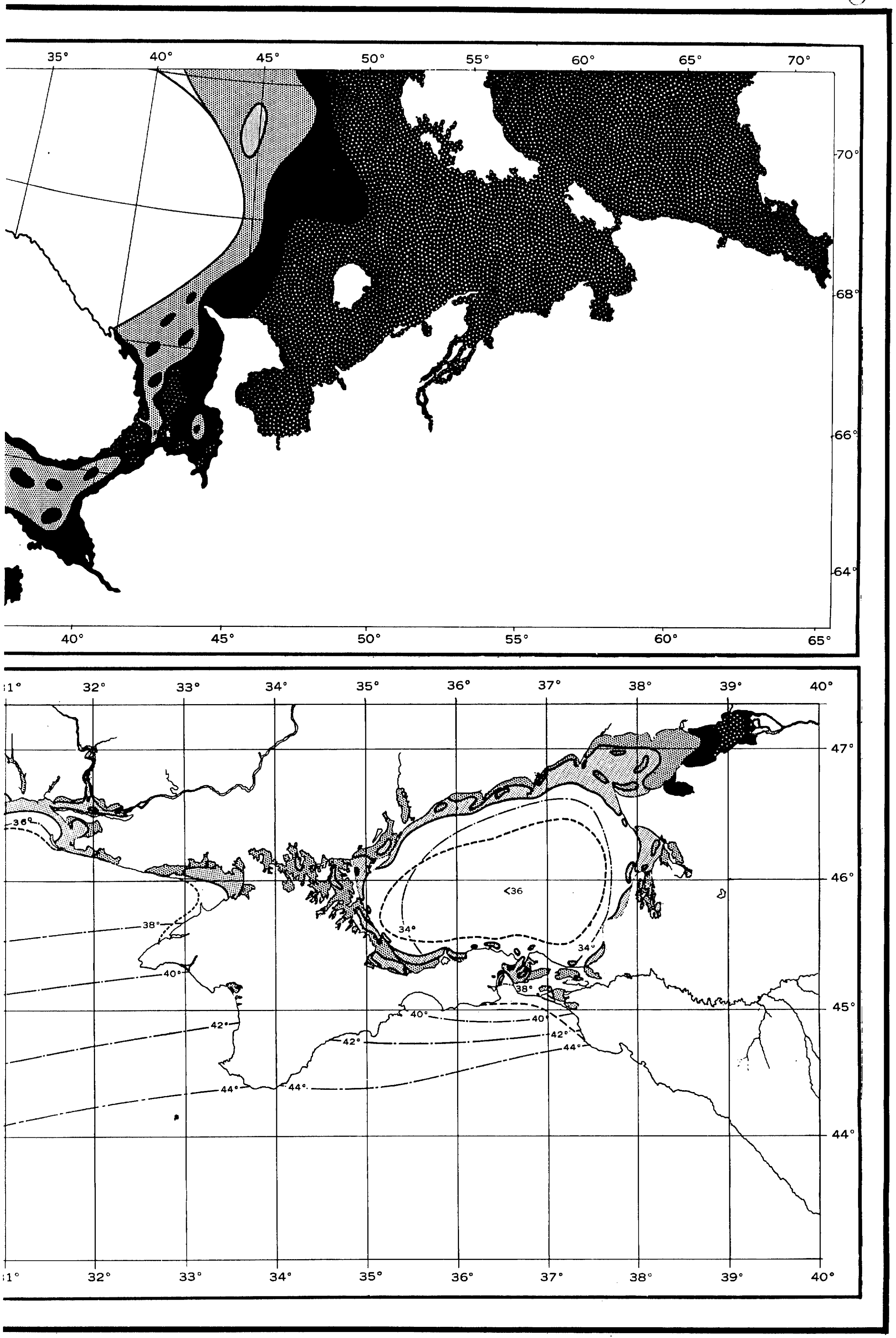
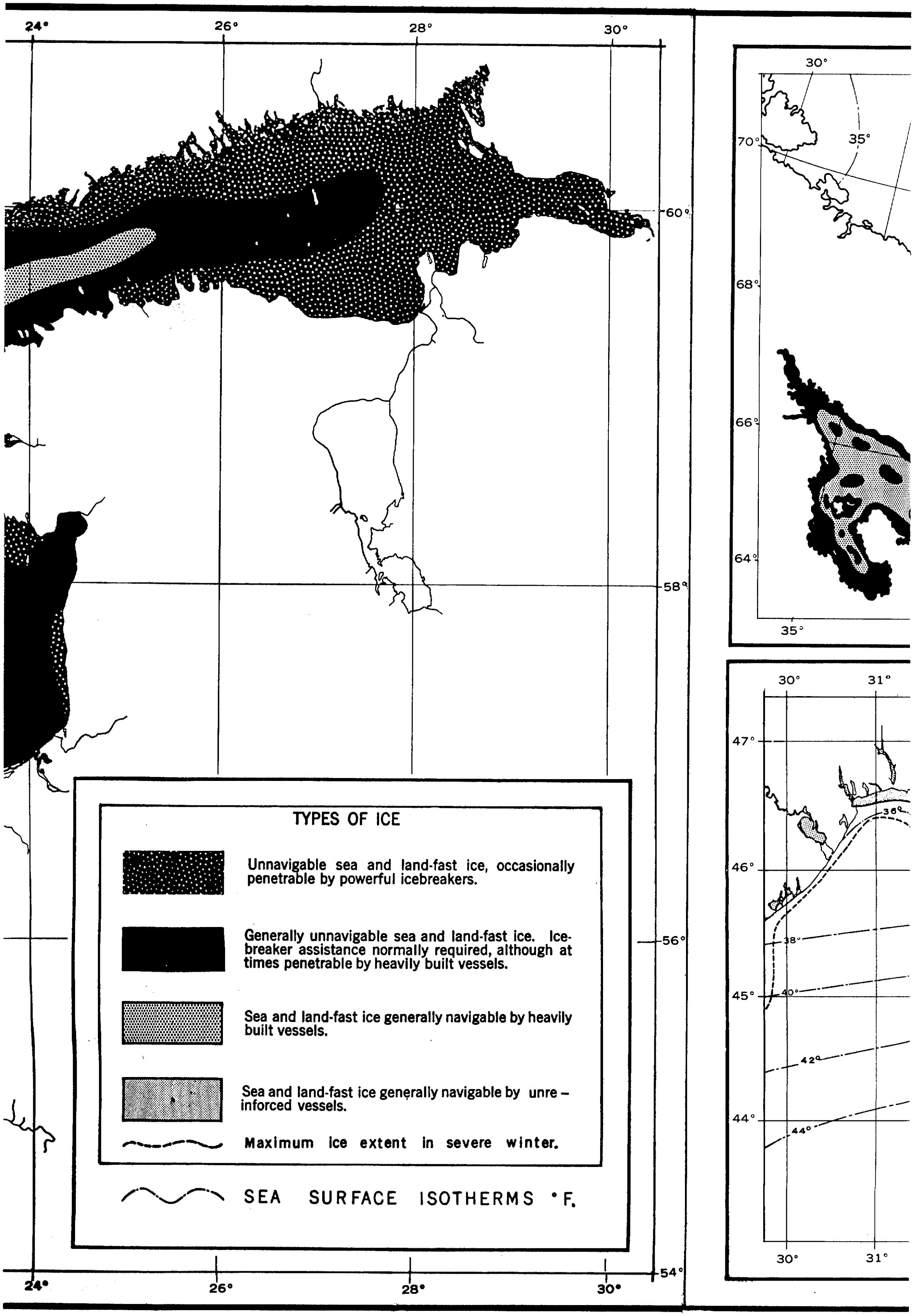

19°
20°
22°
24°
26°
60°
58°
56°
54°
35°
35°
<40°
TYPES OF
Unnavigable sea a
penetrable by powe
Generally unnavigal
breaker assistance
times penetrable by
Sea and land-fast ic
built vessels.
Sea and land-fast ic
inforced vessels.
Maximum ice e
SEA SURFA

FIGURE III-14
SEA SURFACE TEMPERATURE AND ICE, MARCH
JANIS 40
[redacted]



9



Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6

(3)

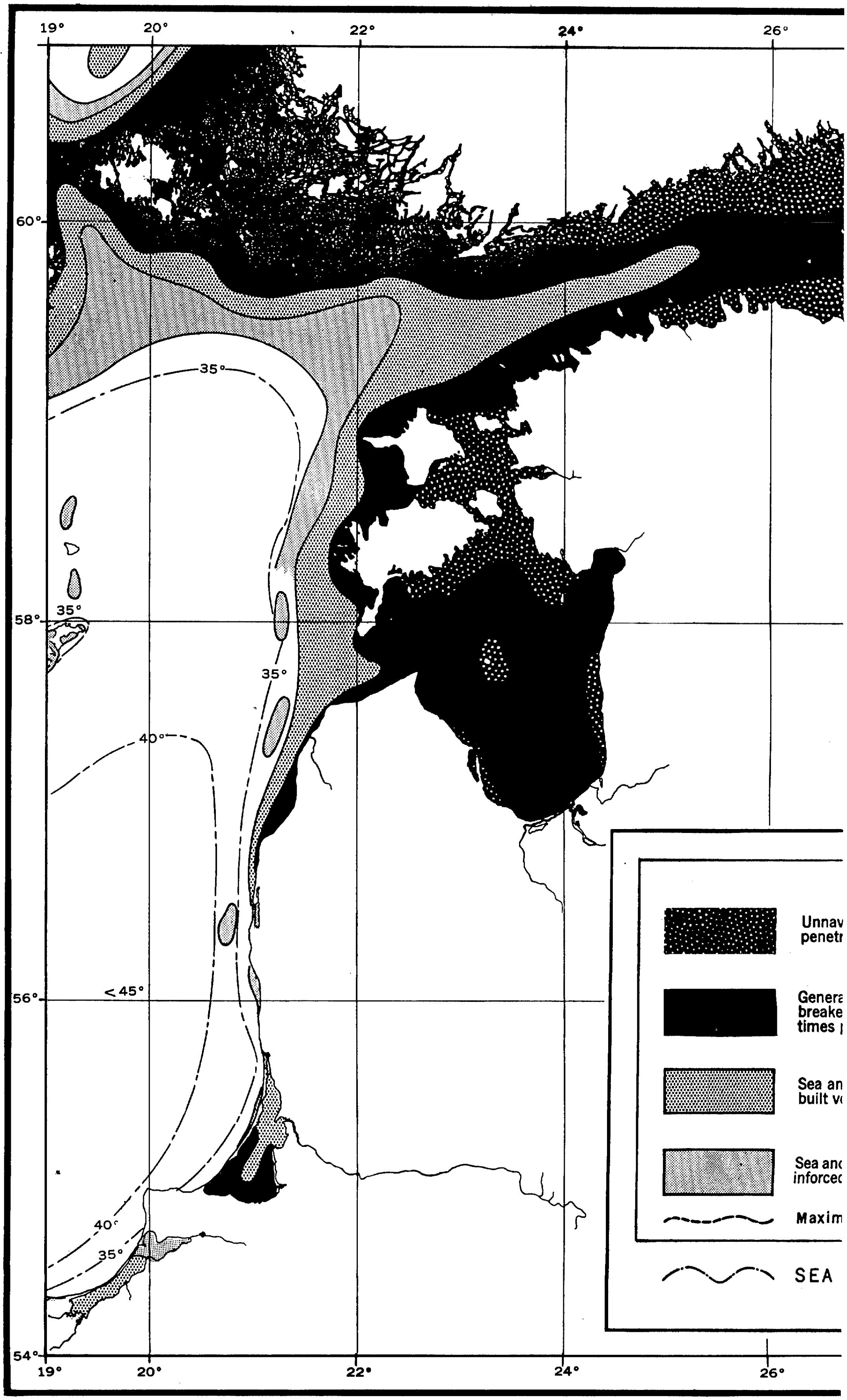
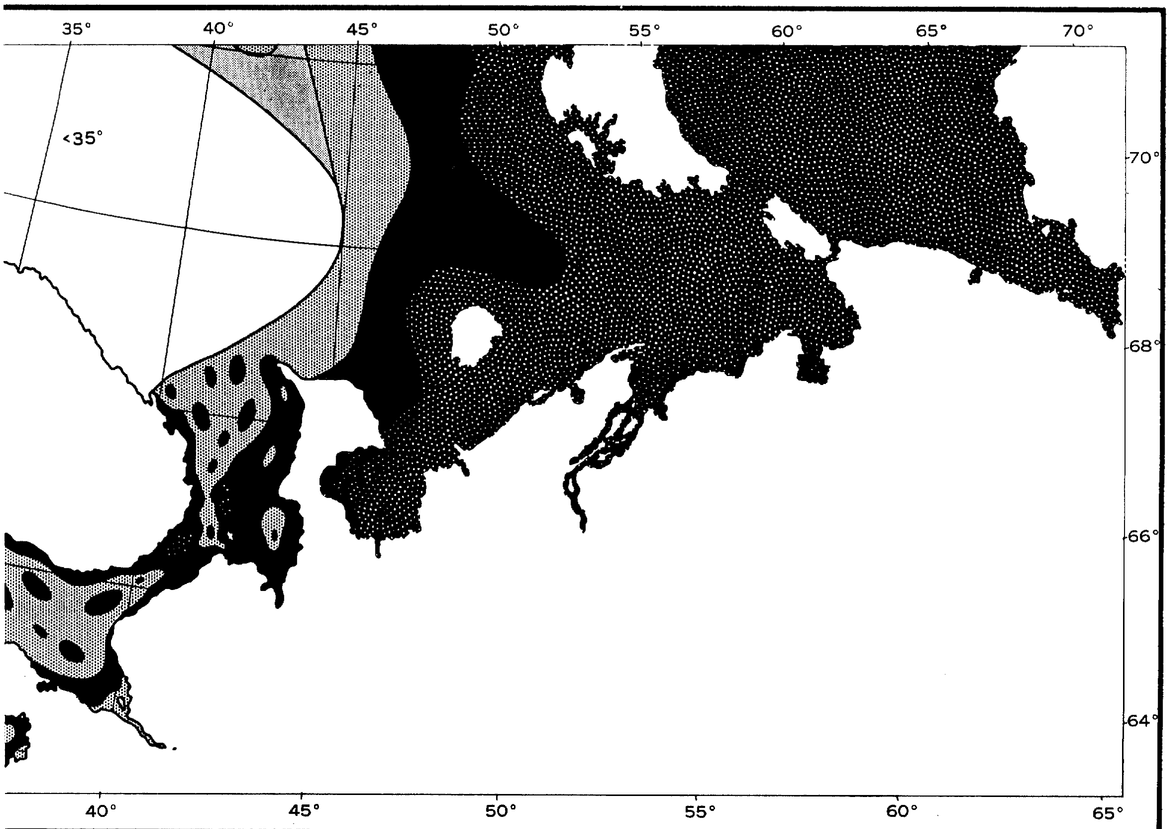
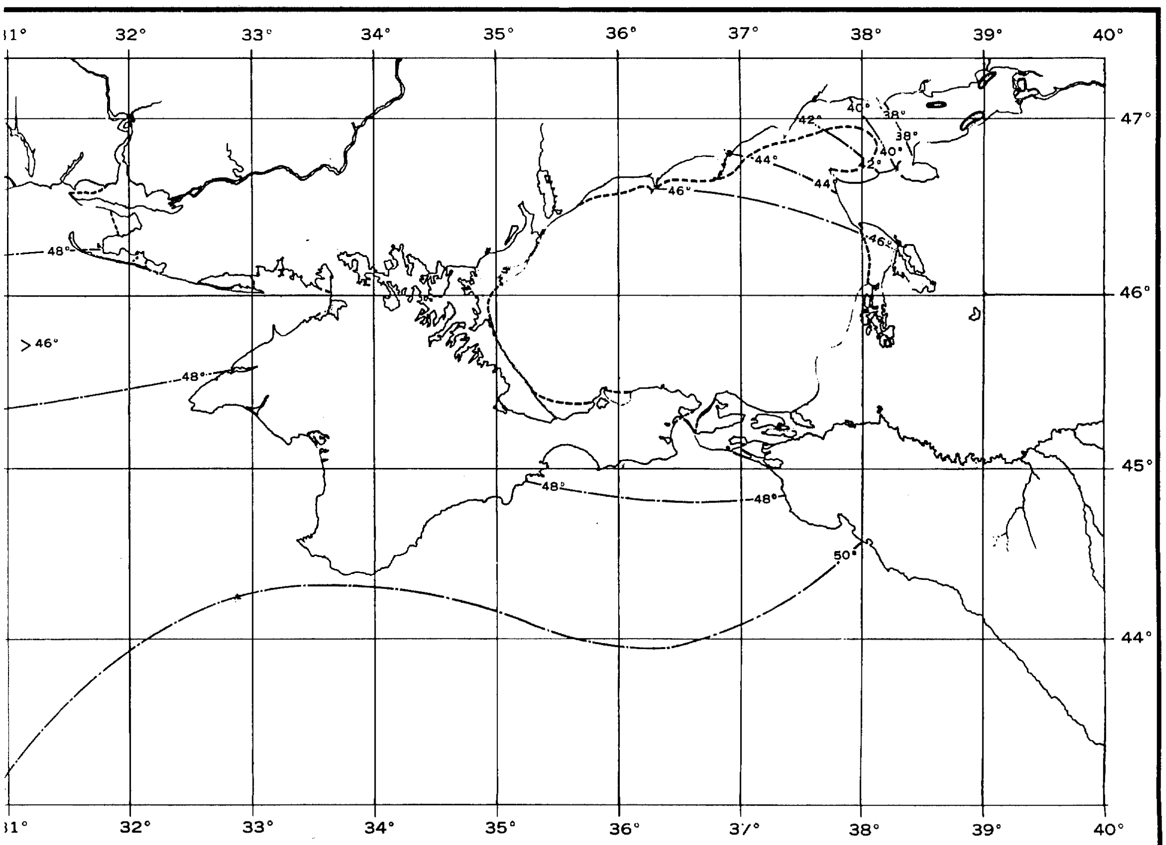
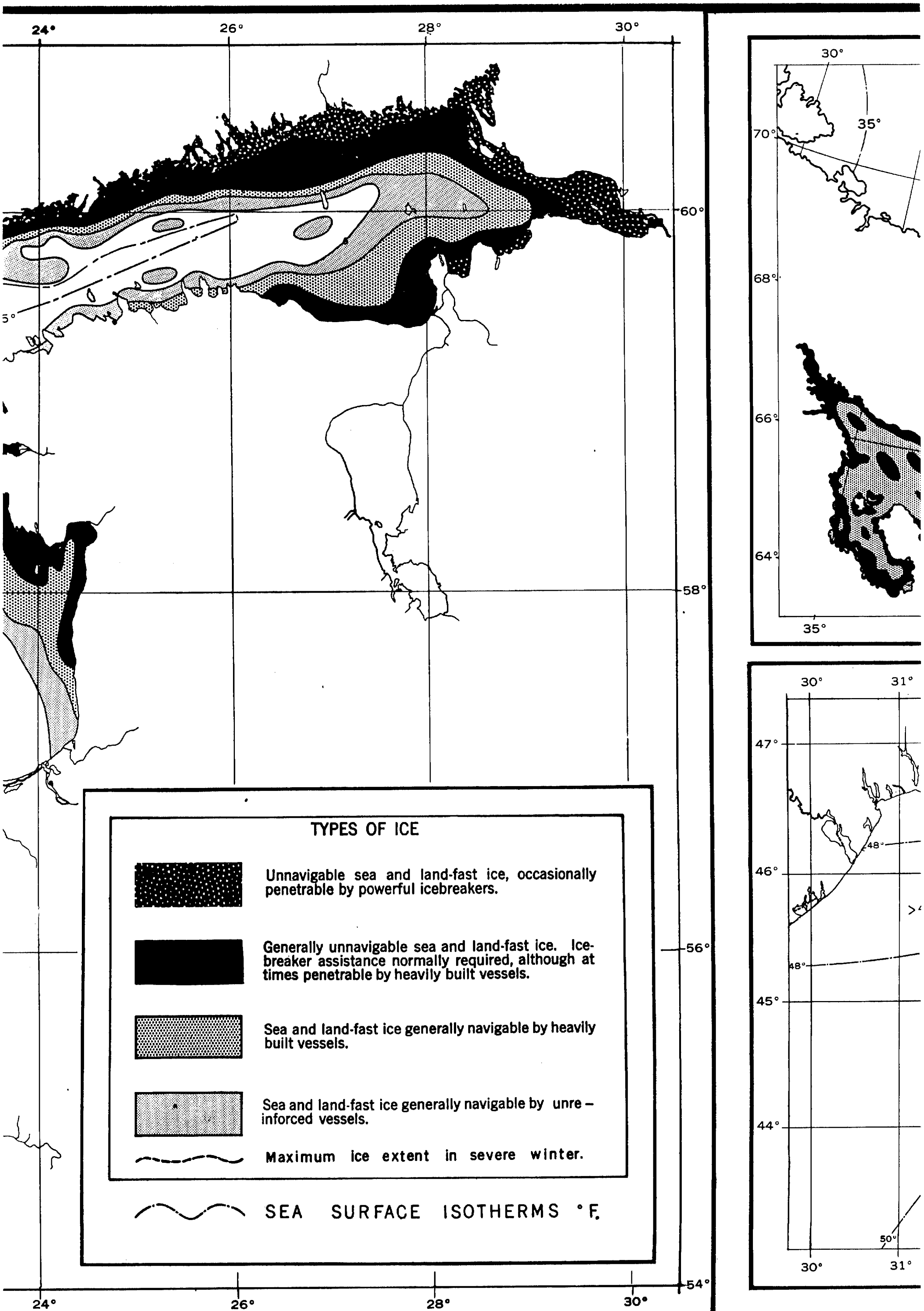

19°
20°
22°
24°
26°
60°
58°
56°
54°
35°
40°
<45°
Unnav
penetr
Genera
breake
times
Sea an
built v
Sea anc
inforcec
Maxim
SEA

FIGURE III-15
SEA SURFACE TEMPERATURE AND ICE, APRIL
JANIS 40
~~CONFIDENTIAL~~






24°
26°
28°
30°
60°
58°
56°
54°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
30°
35°
70°
68°
66°
64°
31°
47°
46°
45°
44°
48°
50°

(3)

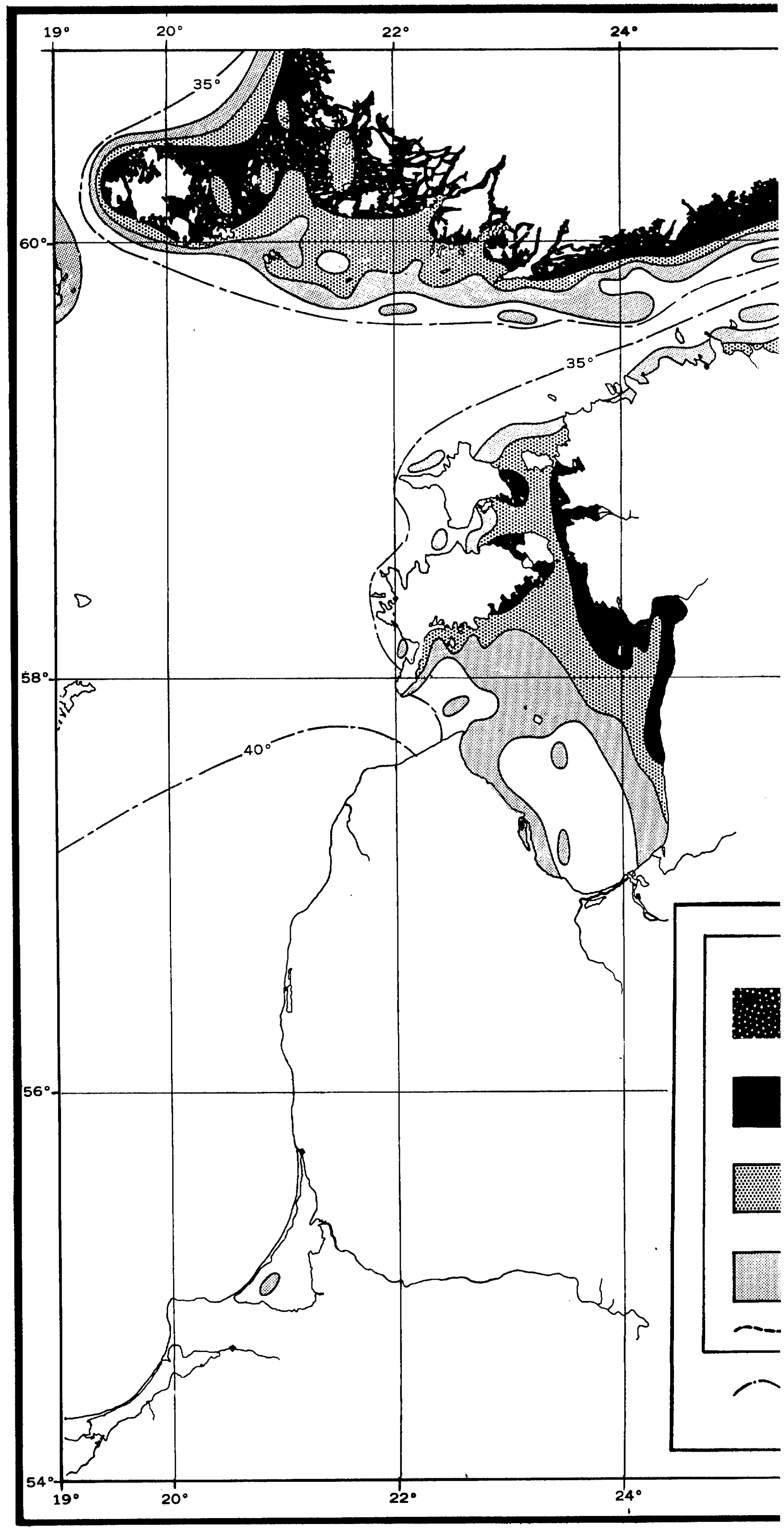
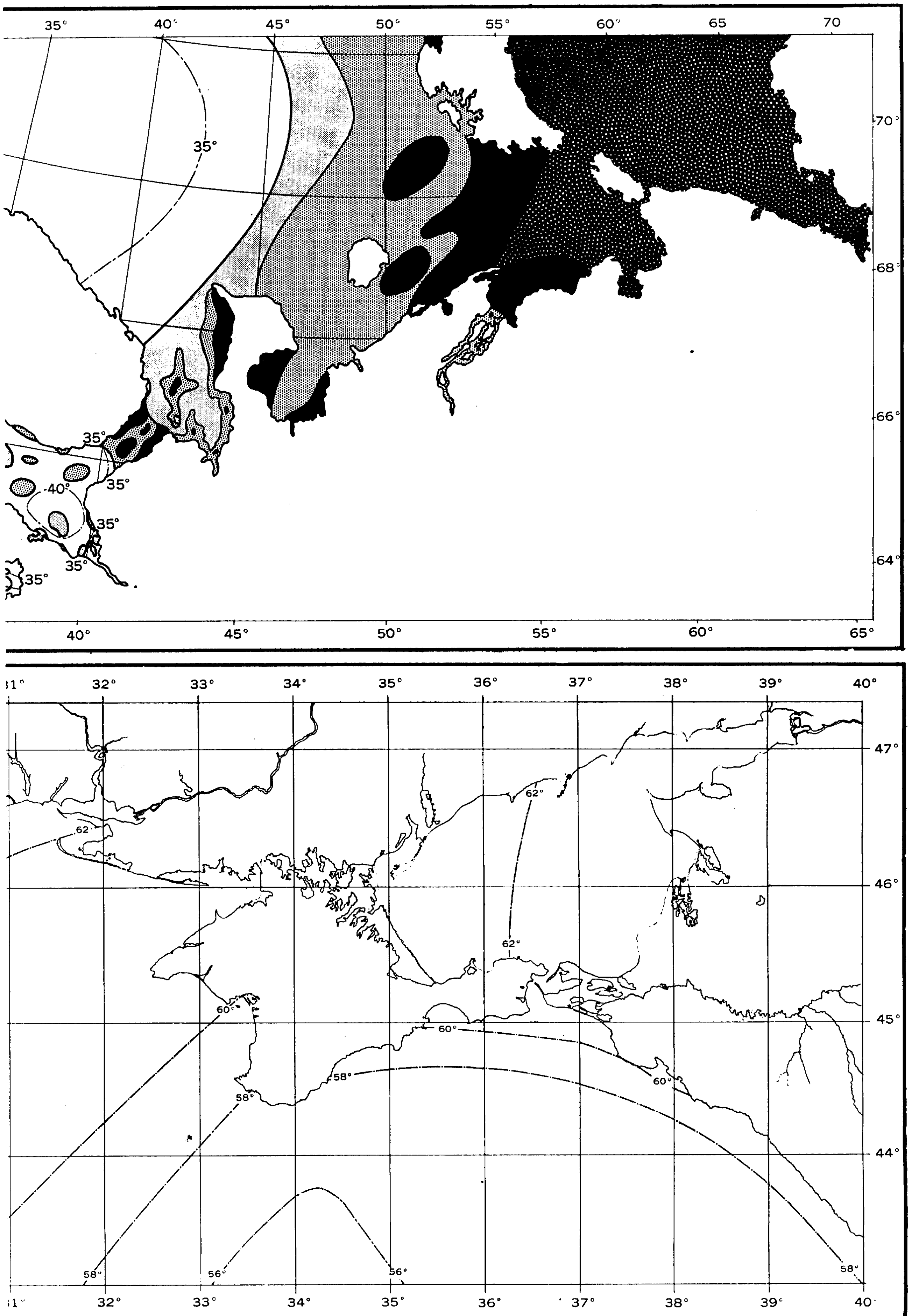
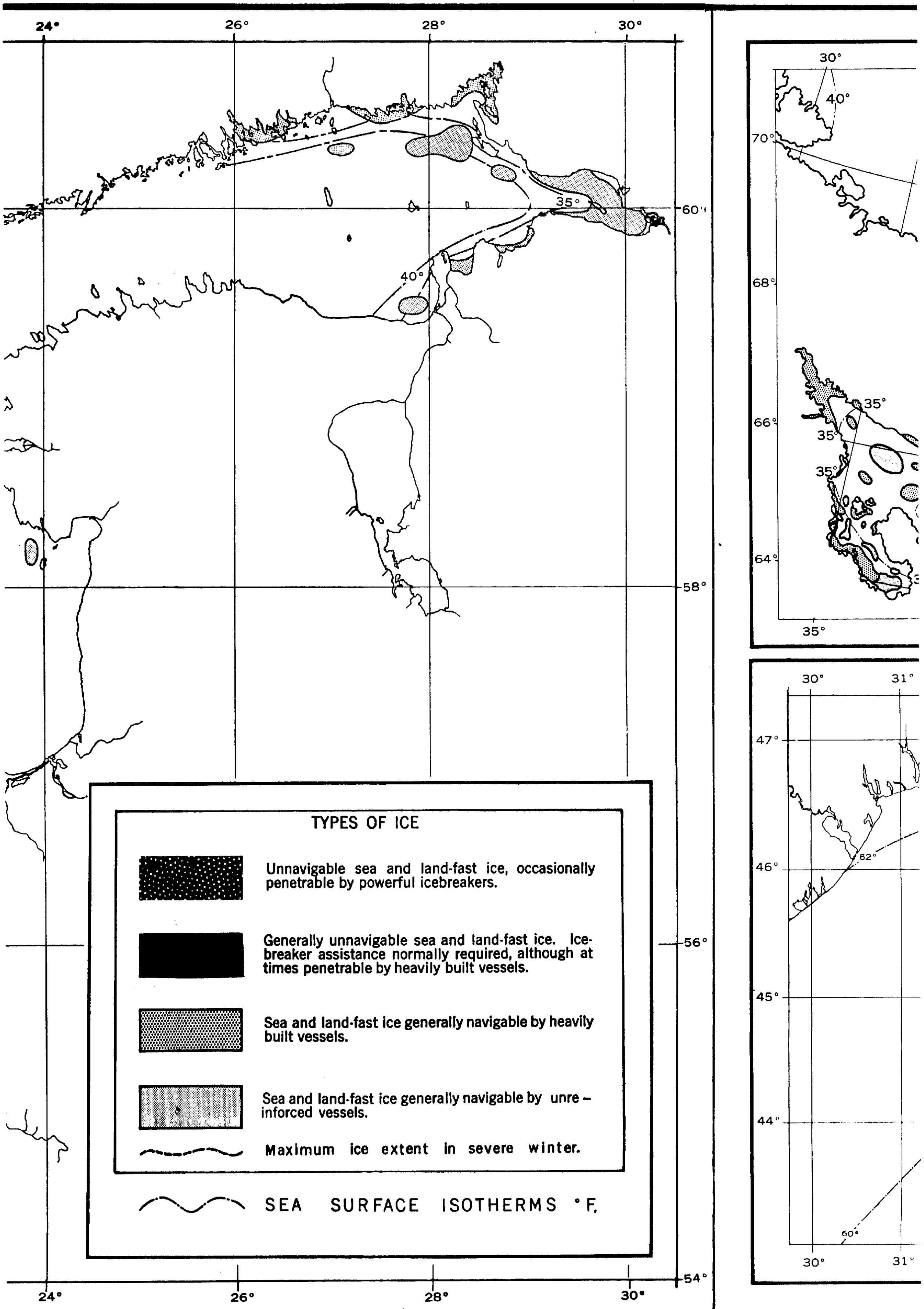


FIGURE III-16
SEA SURFACE TEMPERATURE AND ICE, MAY
JANIS 40
~~CONFIDENTIAL~~



⑨


24°
26°
28°
30°
60°
58°
56°
54°
35°
40°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Icebreaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unreinforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
70°
68°
66°
64°
47°
46°
45°
44°
62°
60°
31°

(3)

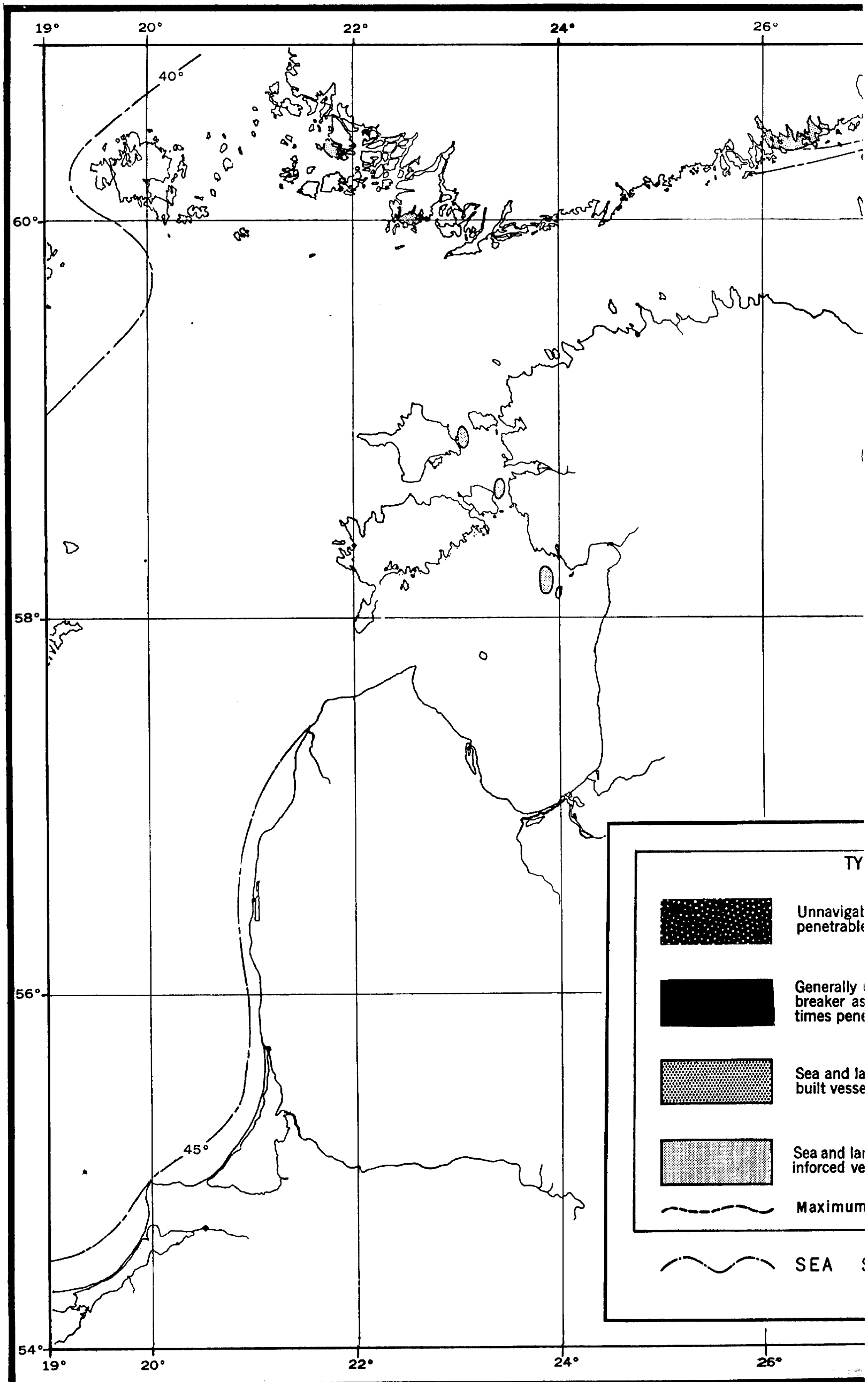
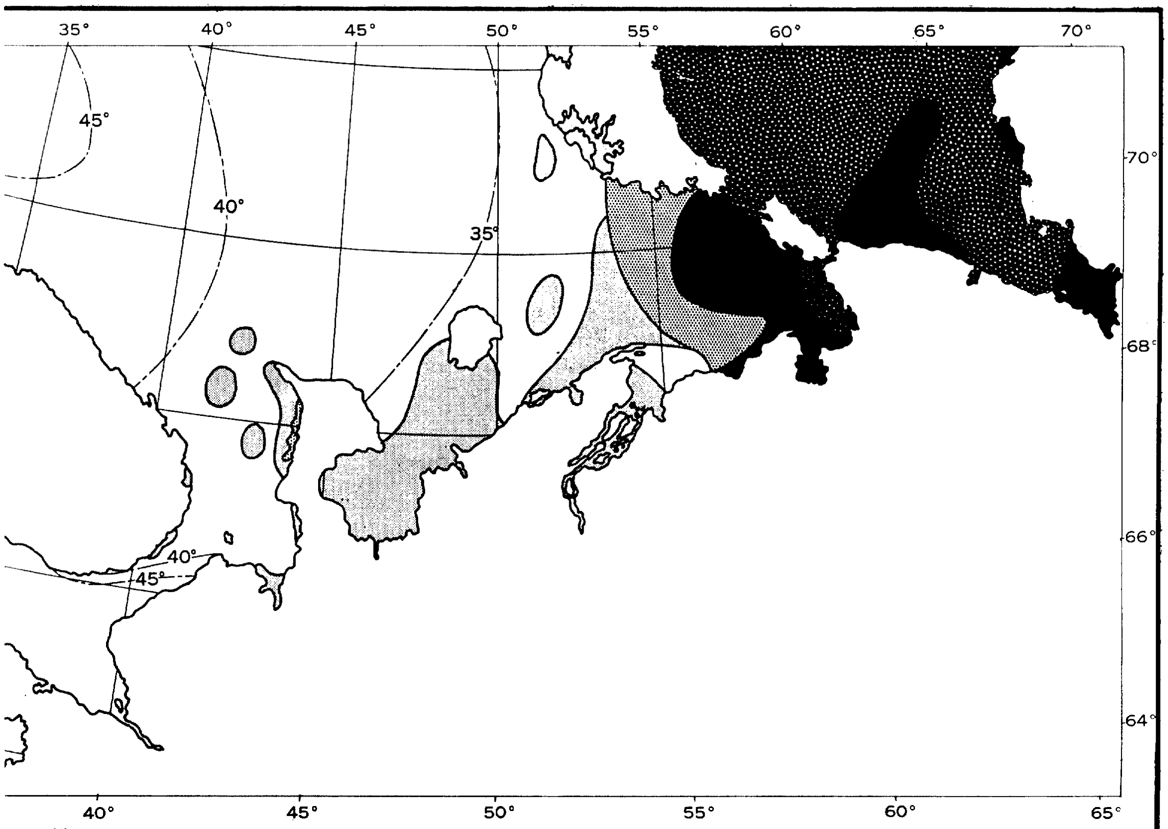
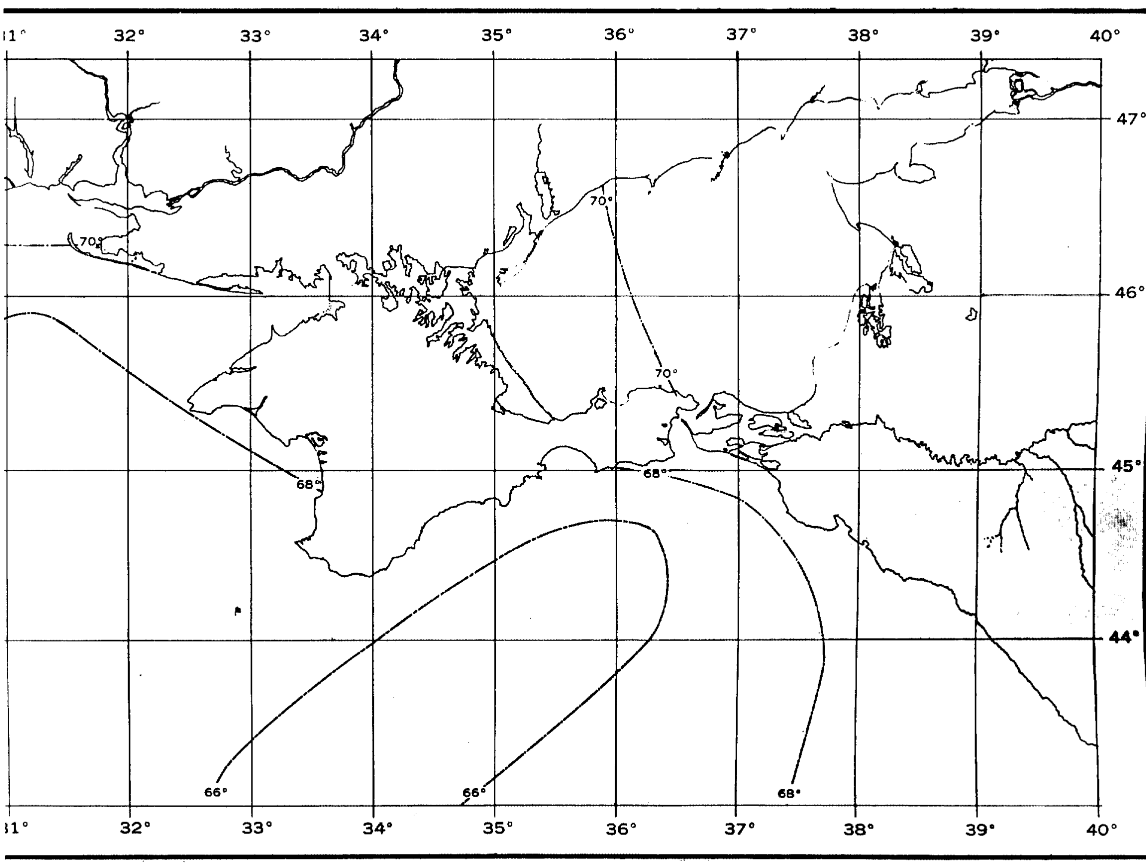
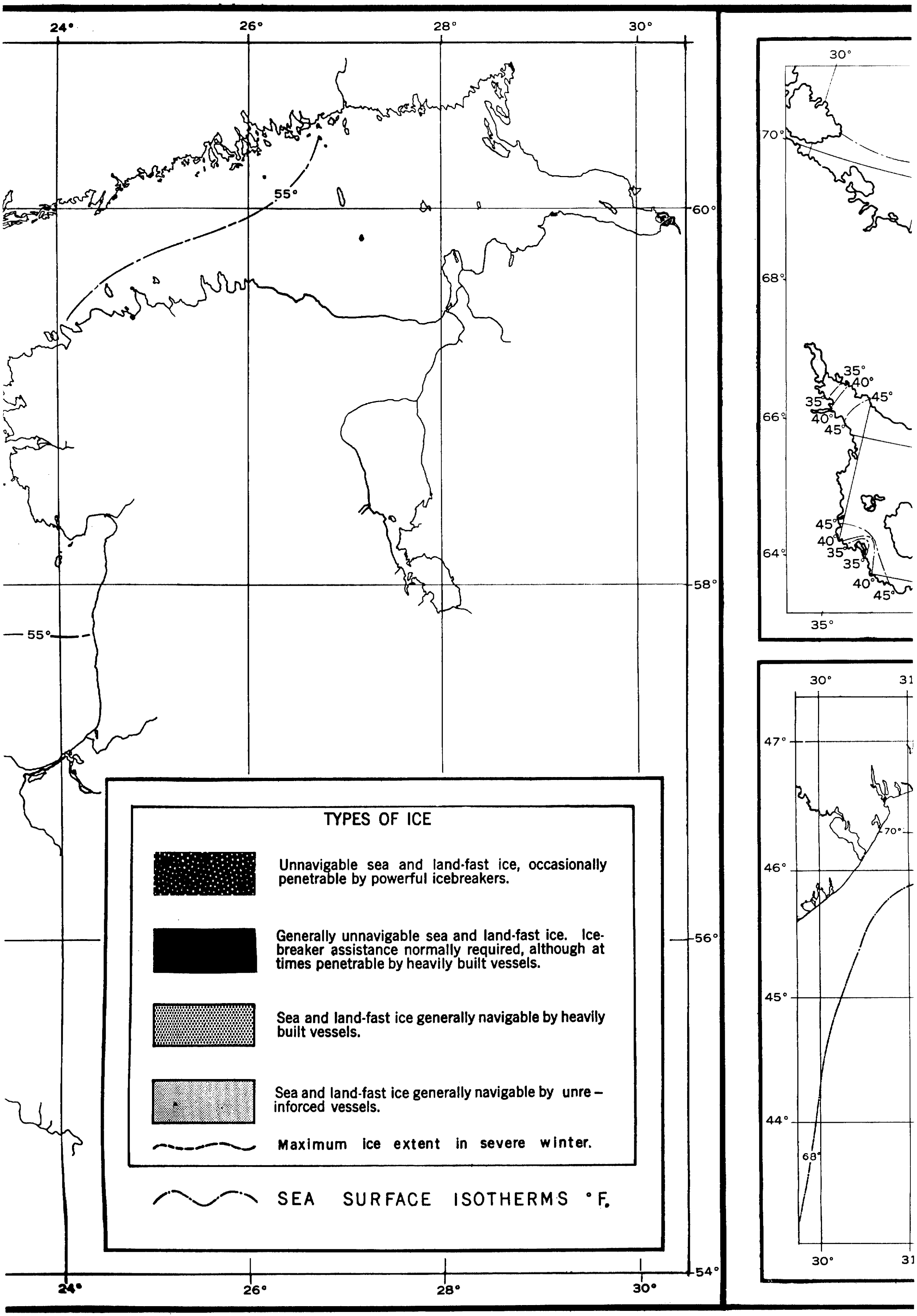

19°
20°
22°
24°
26°
40°
60°
58°
56°
45°
54°
TY
Unnavigat
penetrable
Generally
breaker as
times pene
Sea and la
built vesse
Sea and lar
inforced ve
Maximum
SEA

FIGURE III-17
SEA SURFACE TEMPERATURE AND ICE, JUNE
JANIS 40
[redacted]

(7)







Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6

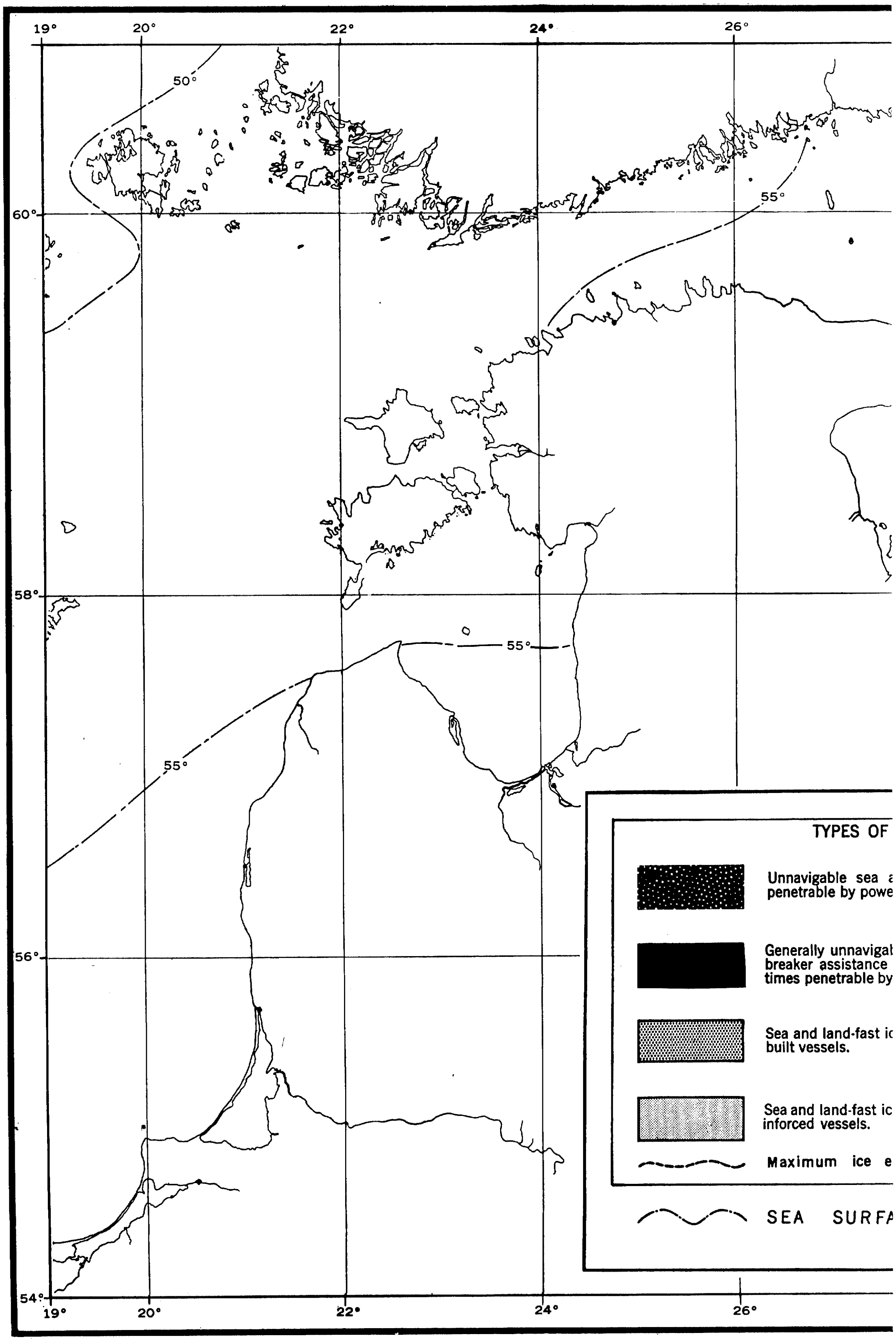
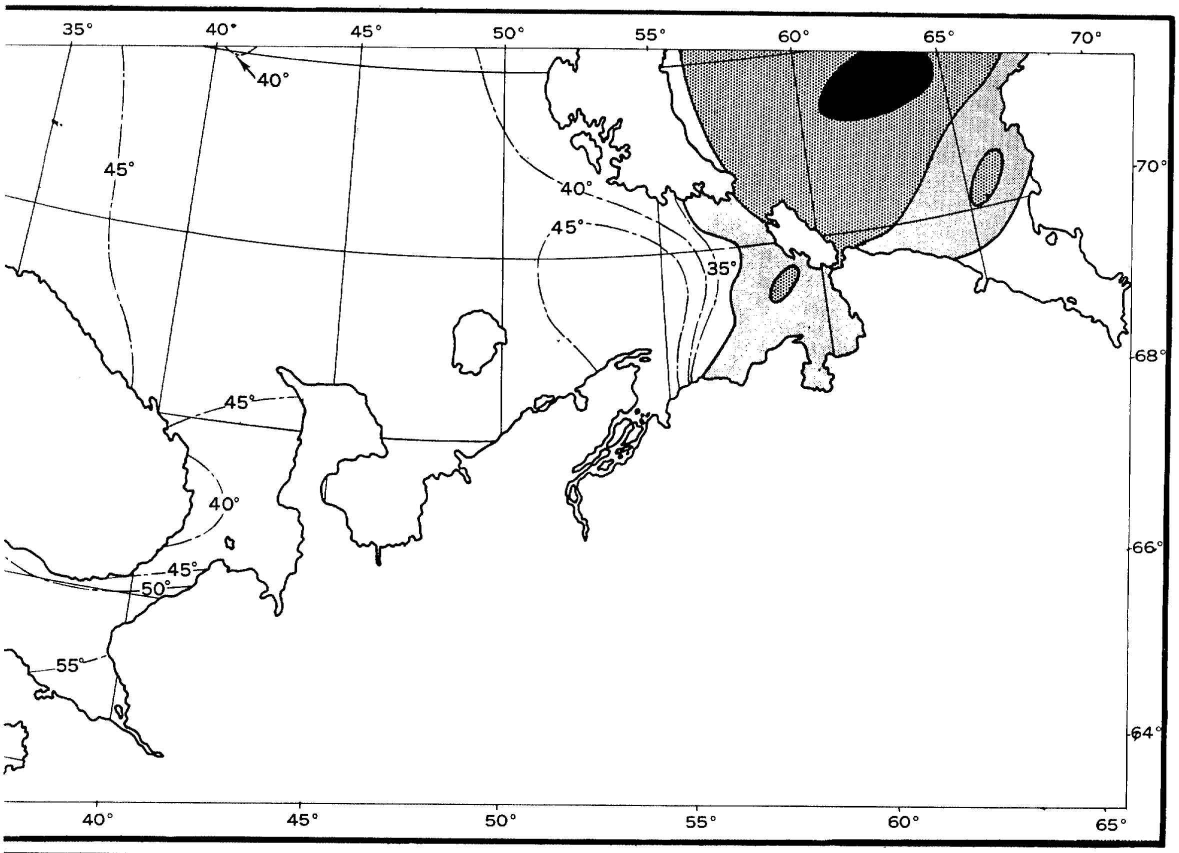
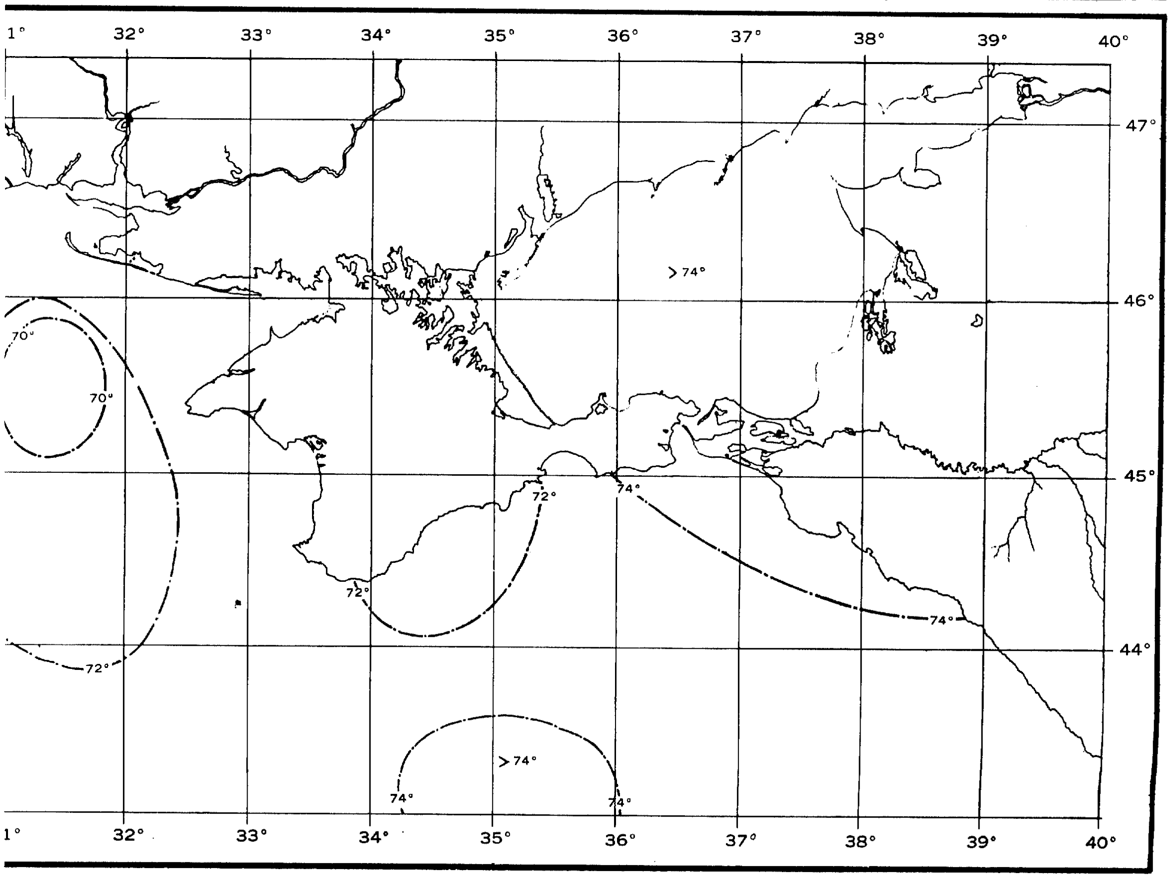
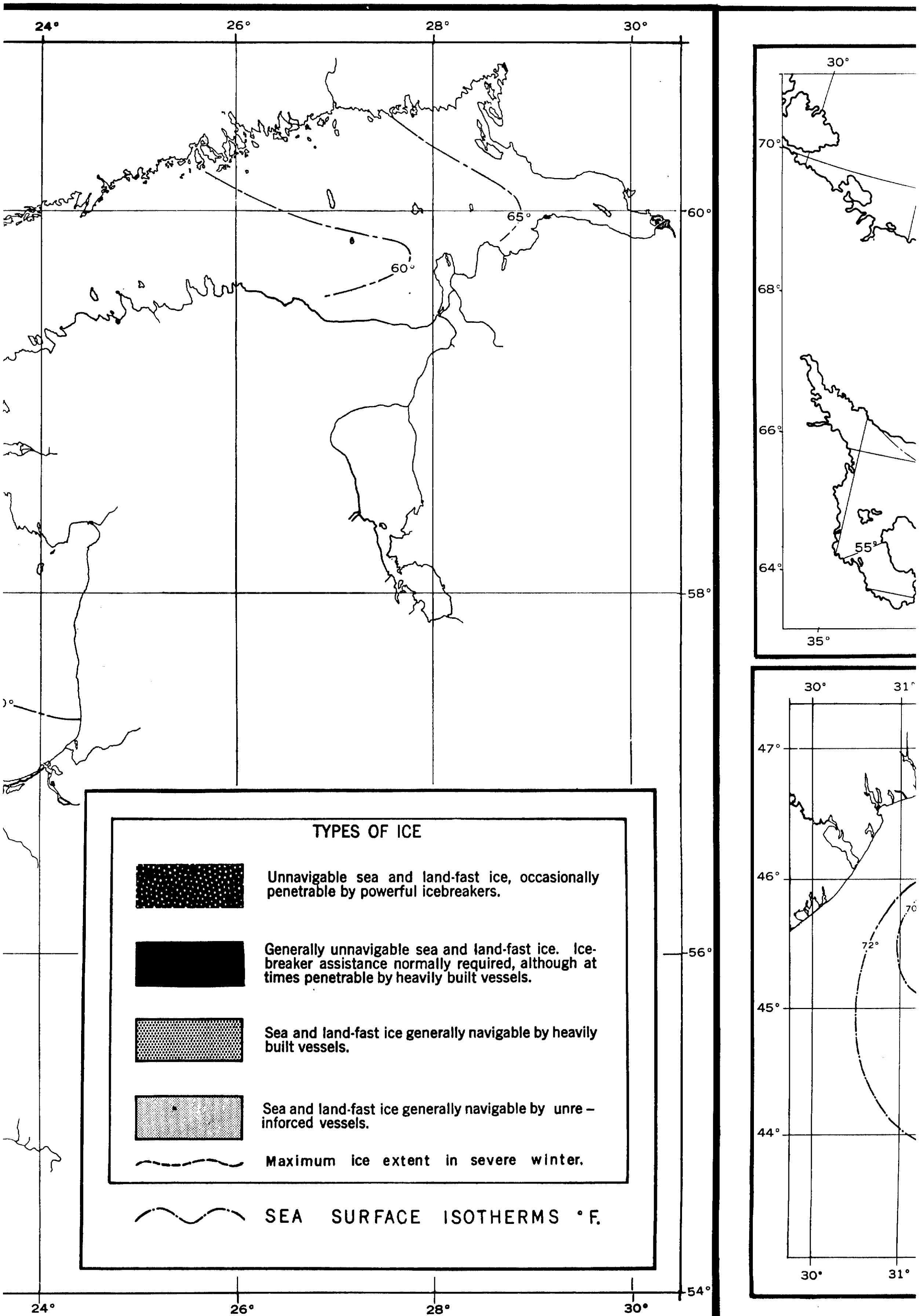

19°
20°
22°
24°
26°
60°
58°
56°
54°
50°
55°
55°
55°
55°
TYPES OF
Unnavigable sea a
penetrable by powe
Generally unnavigal
breaker assistance
times penetrable by
Sea and land-fast ic
built vessels.
Sea and land-fast ic
inforced vessels.
Maximum ice e
SEA SURFA

FIGURE III-18
SEA SURFACE TEMPERATURE AND ICE, JULY
JANIS 40
~~CONFIDENTIAL~~





[redacted]


24°
26°
28°
30°
60°
58°
56°
54°
65°
60°
70°
68°
66°
64°
55°
35°
31°
47°
46°
45°
44°
72°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.

3

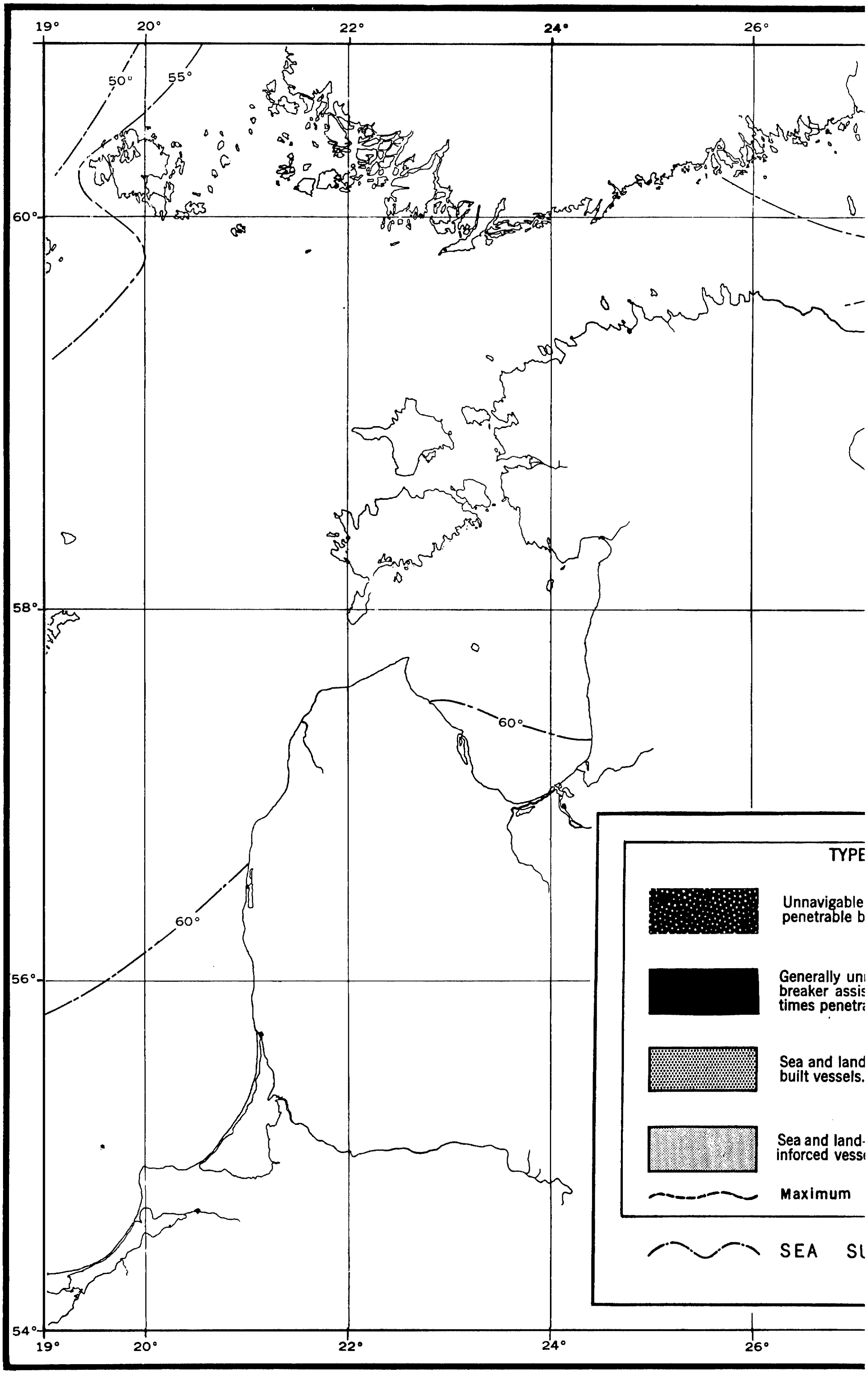
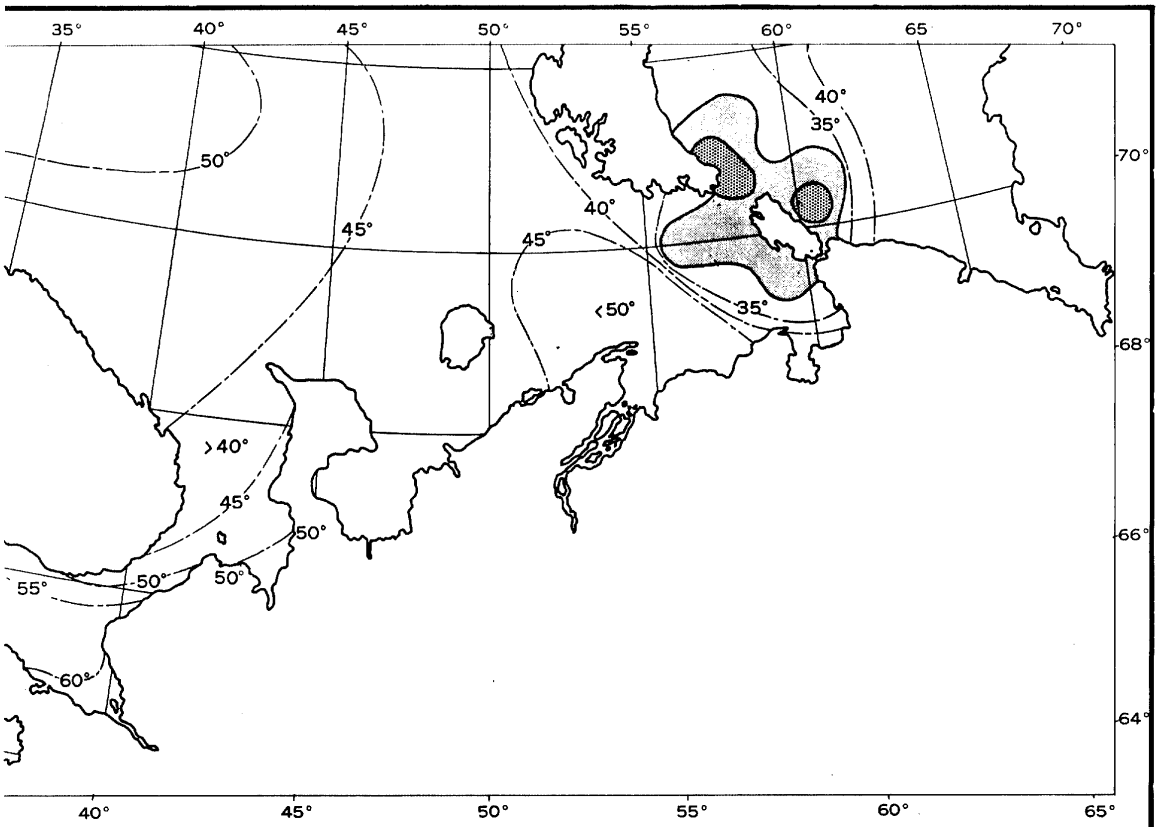
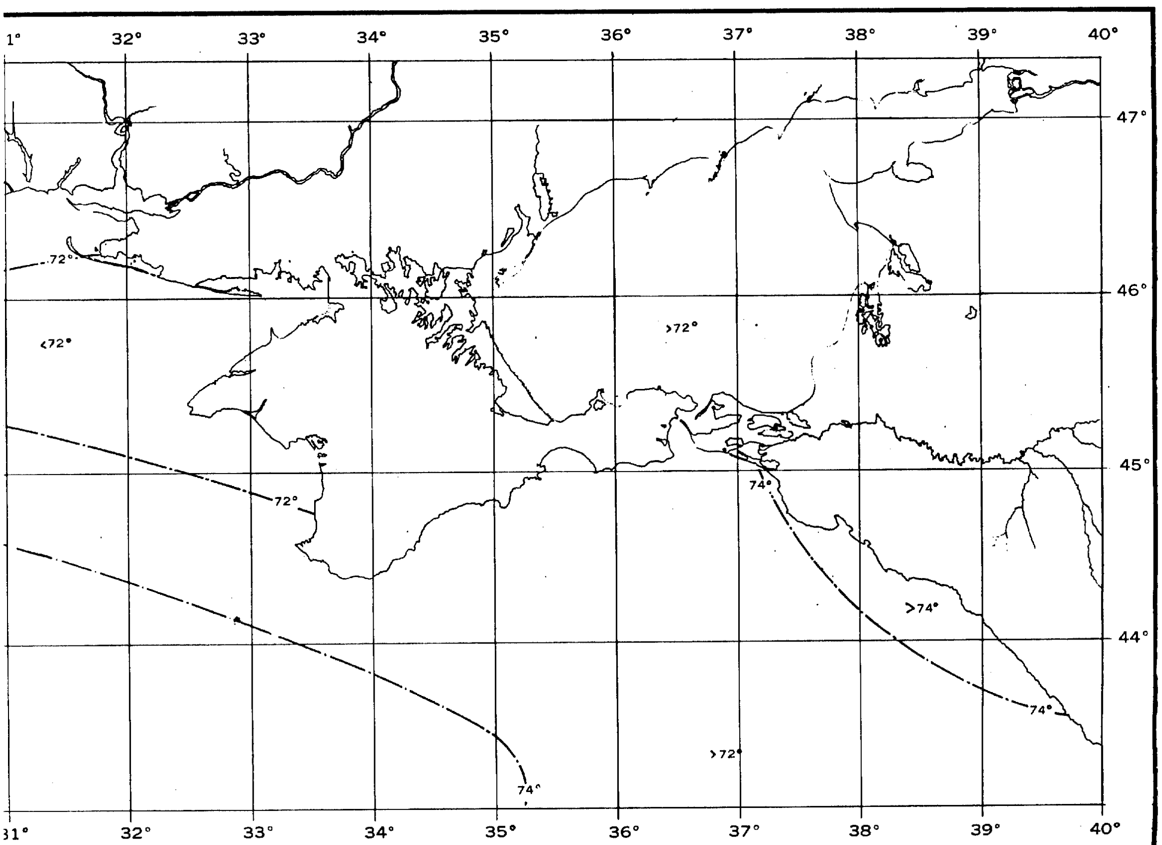
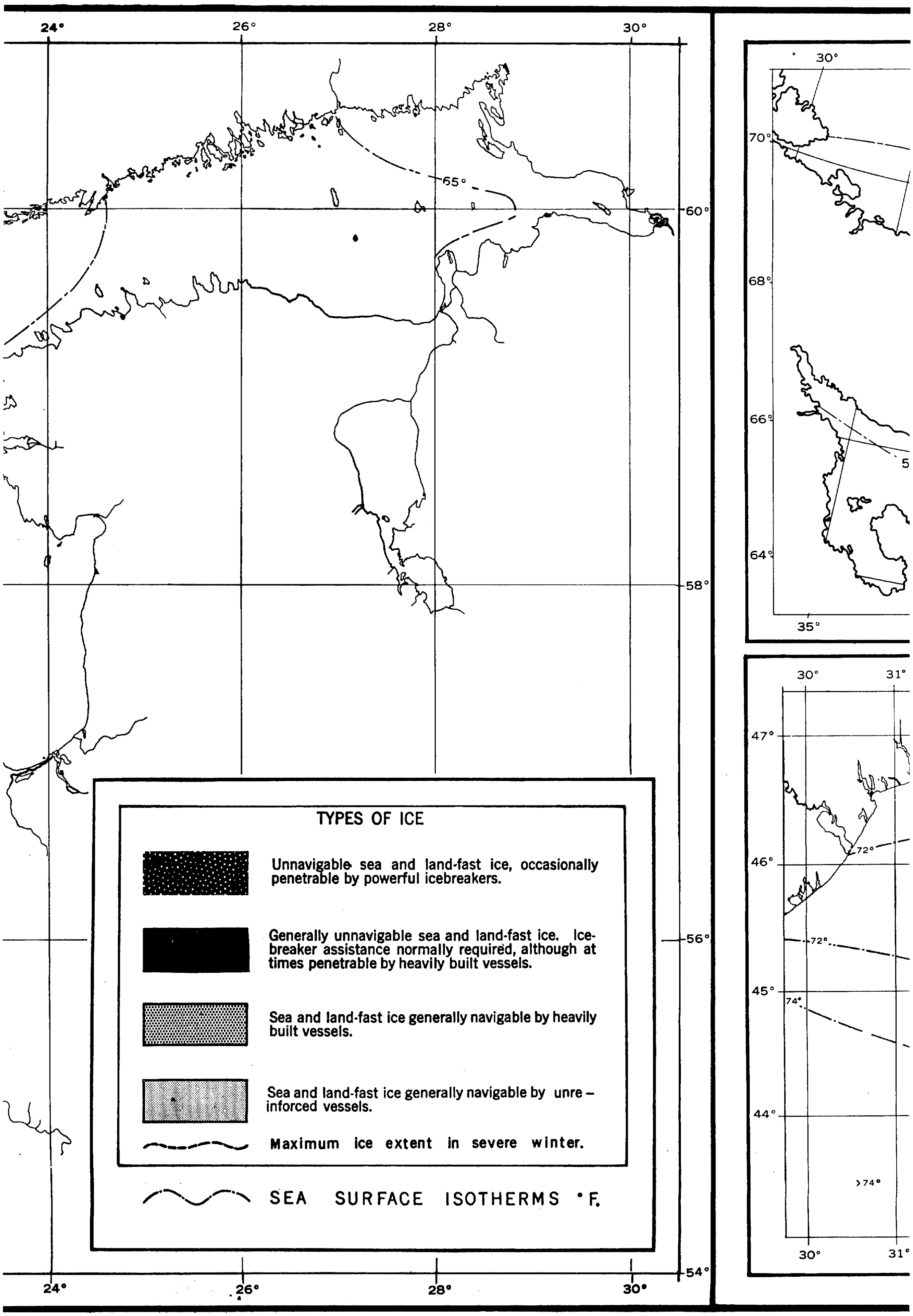

19°
20°
22°
24°
26°
50°
55°
60°
58°
56°
54°
60°
60°
TYPE
Unnavigable
penetrable b
Generally un
breaker assis
times penetra
Sea and land
built vessels.
Sea and land-
inforced vess
Maximum
SEA SU

FIGURE III-19
SEA SURFACE TEMPERATURE AND ICE, AUGUST
JANIS 40
[redacted]

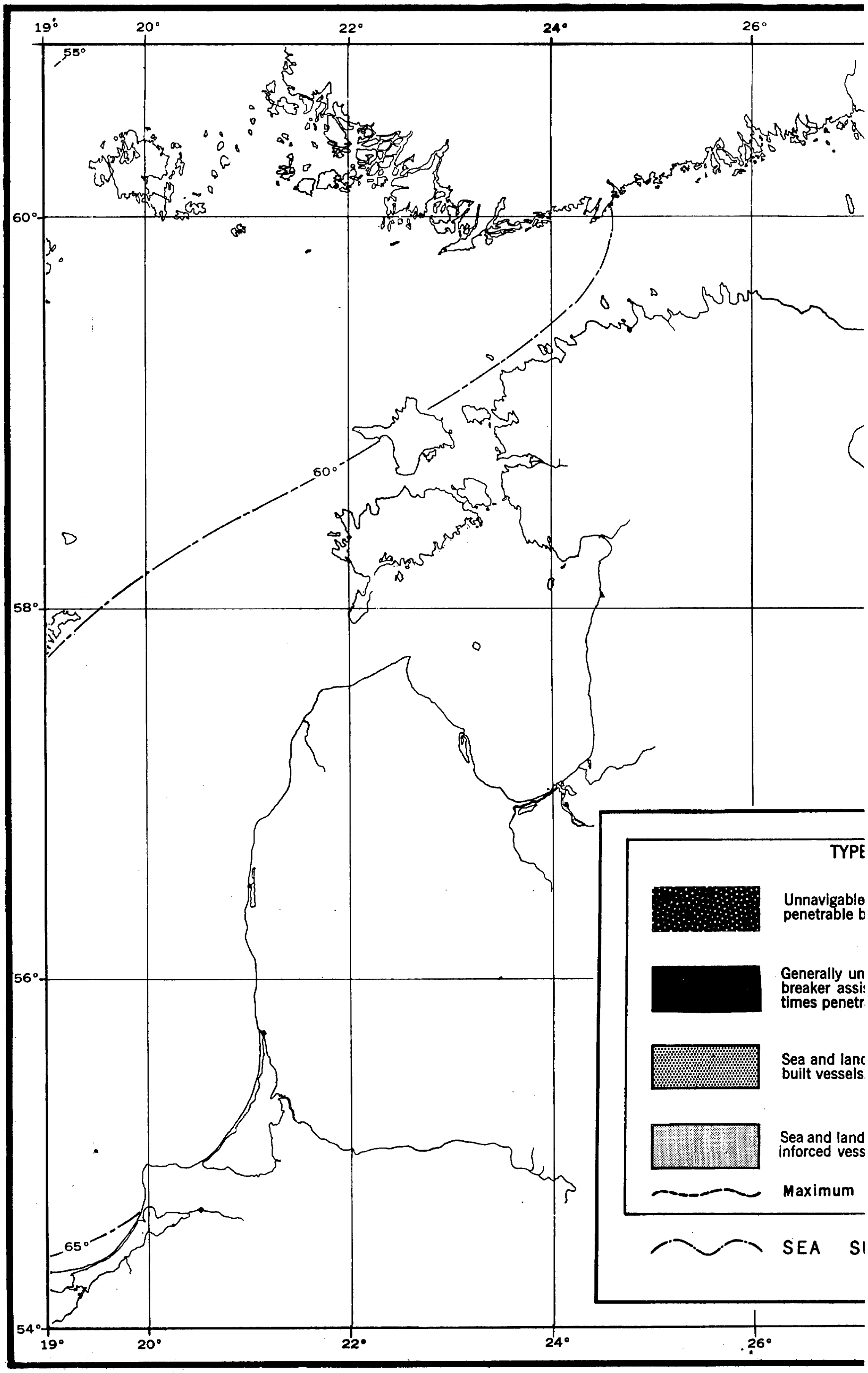
(1)






24°
26°
28°
30°
65°
60°
58°
56°
54°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
30°
70°
68°
66°
64°
35°
31°
47°
46°
72°
45°
74°
44°
>74°

3



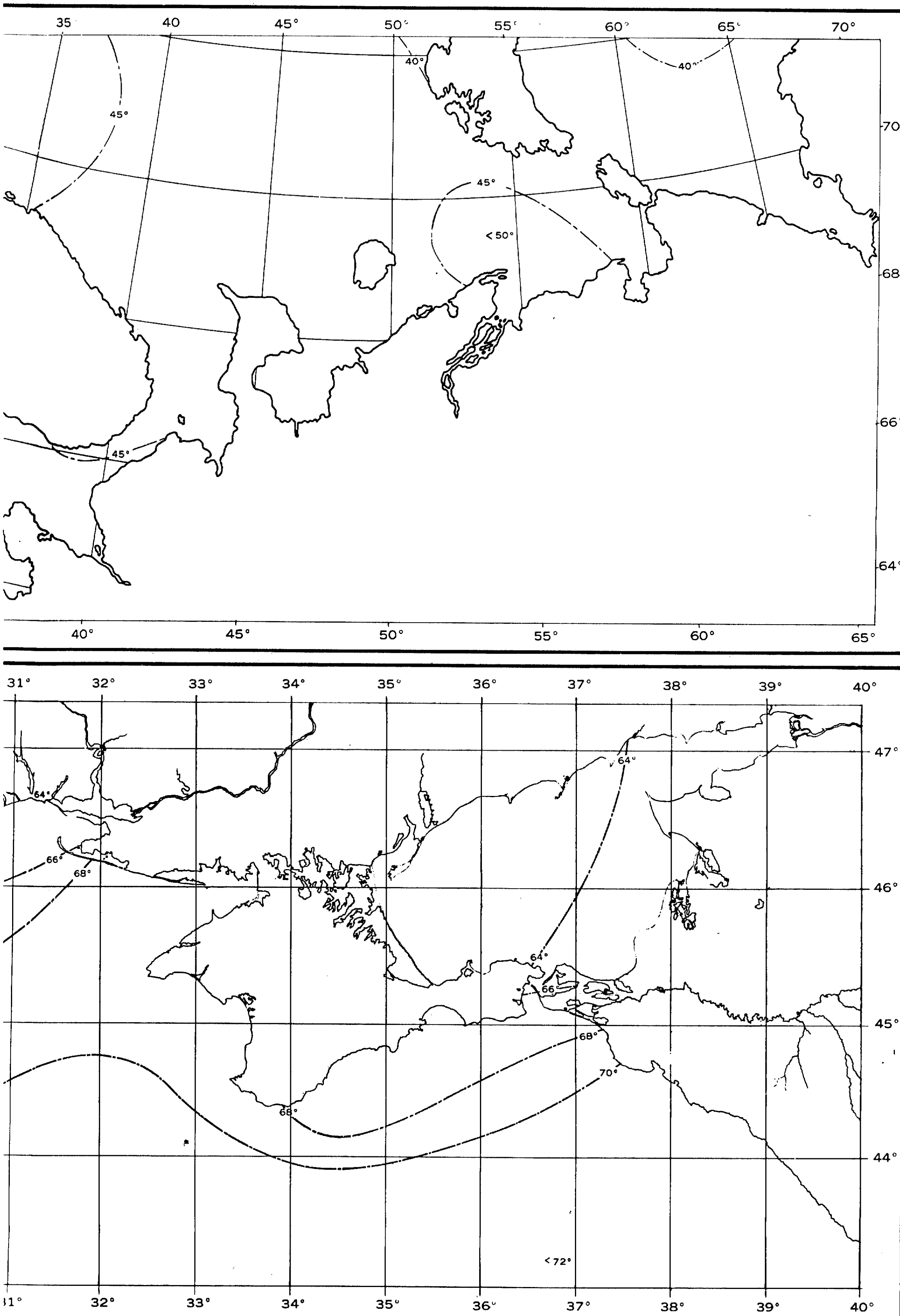
19°
20°
22°
24°
26°
55°
60°
58°
56°
54°
60°
65°
TYPE
Unnavigable
penetrable b
Generally un
breaker assi
times penetr
Sea and lanc
built vessels
Sea and land
inforced vess
Maximum
SEA SI

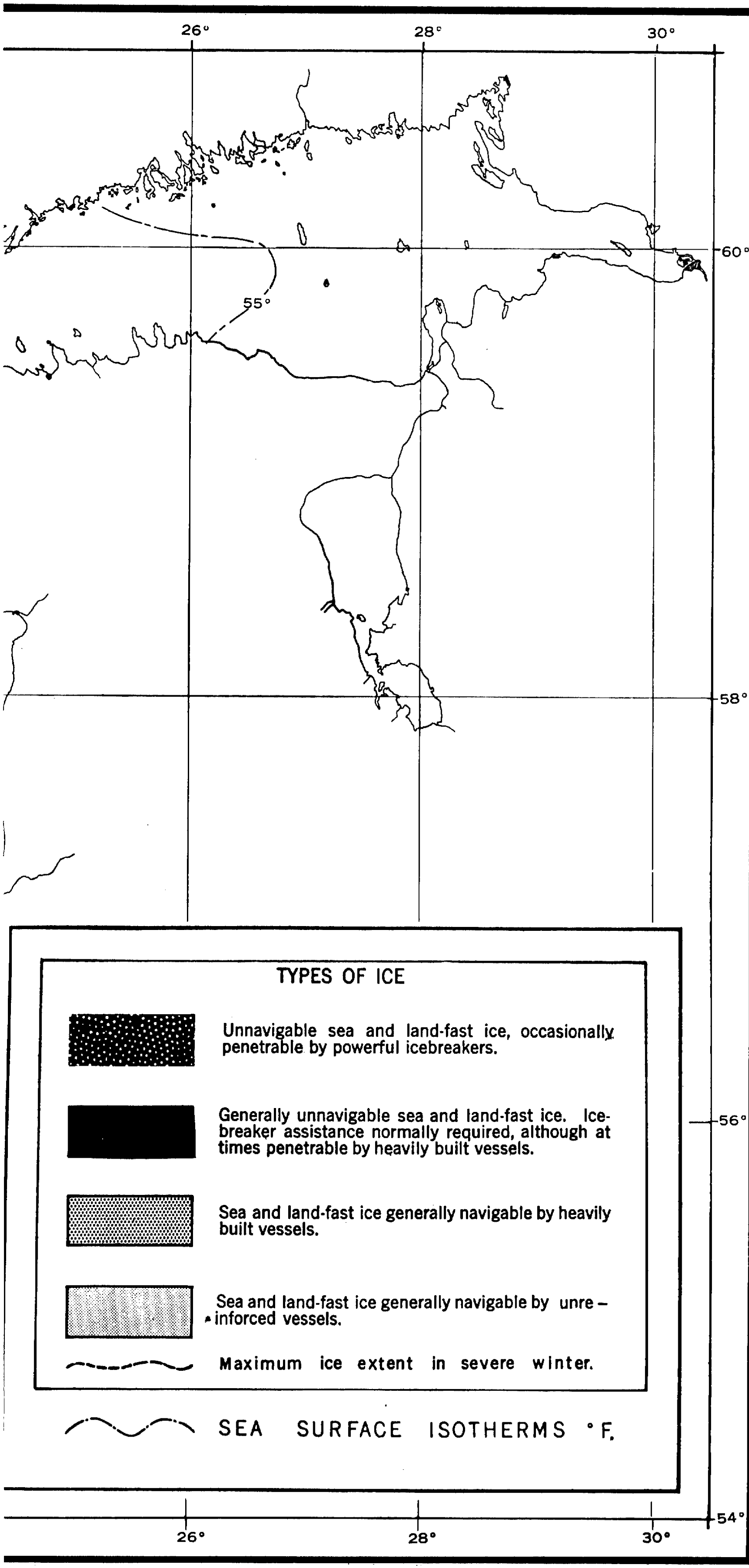
FIGURE III-20

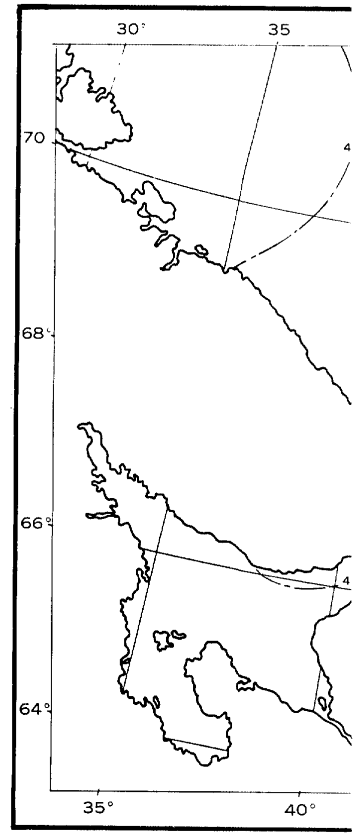
SEA SURFACE TEMPERATURE AND ICE, SEPTEMBER

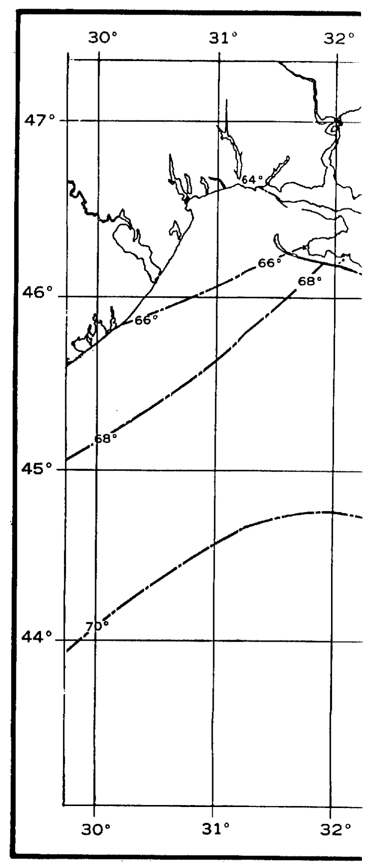
JANIS 40

~~CONFIDENTIAL~~




26°
28°
30°
60°
55°
58°
56°
54°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Icebreaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unreinforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.


30°
35
70
68°
66°
64°
35°
40°


30°
31°
32°
47°
46°
45°
44°
64°
66°
68°
70°

3 [redacted]

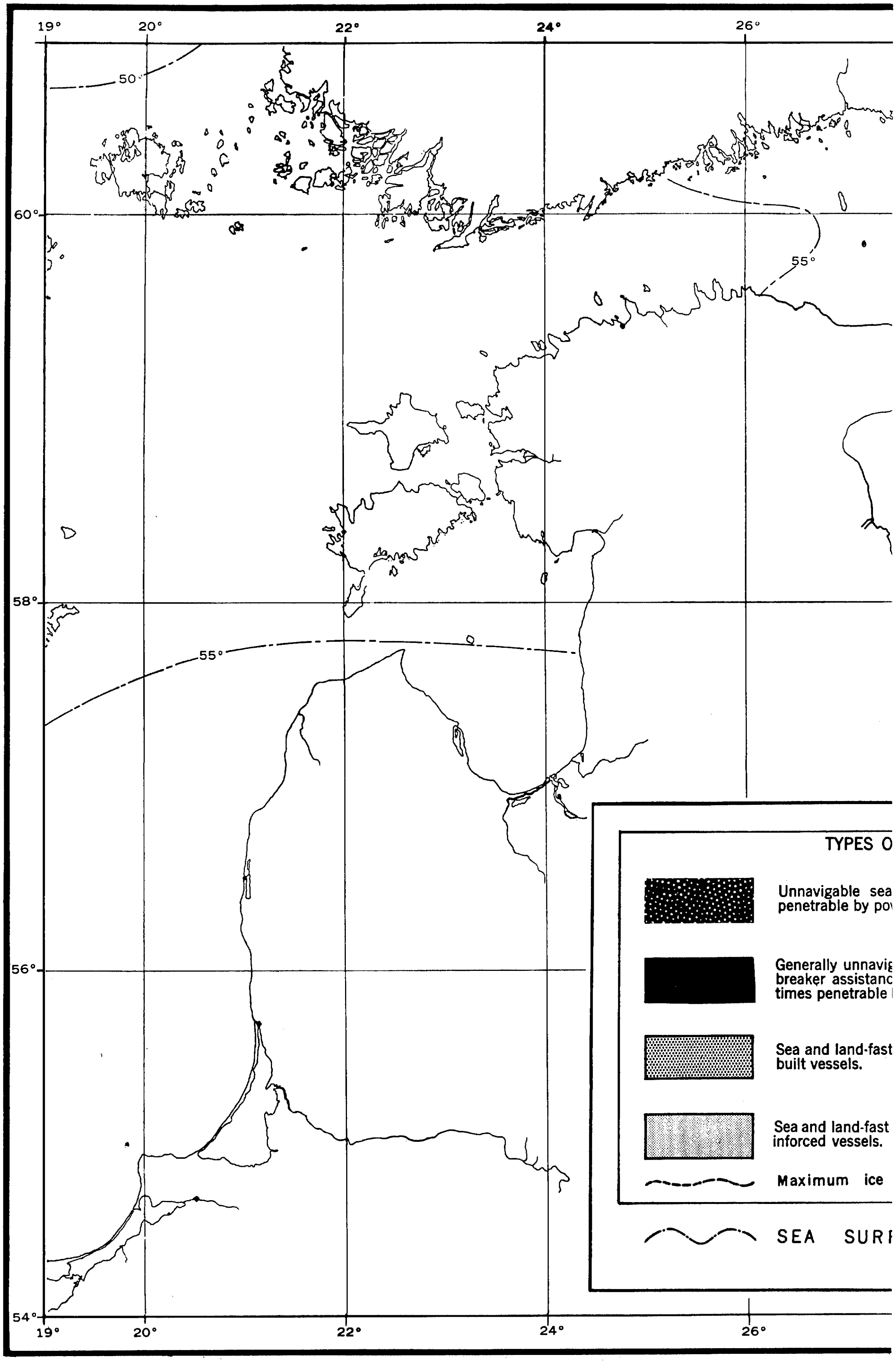
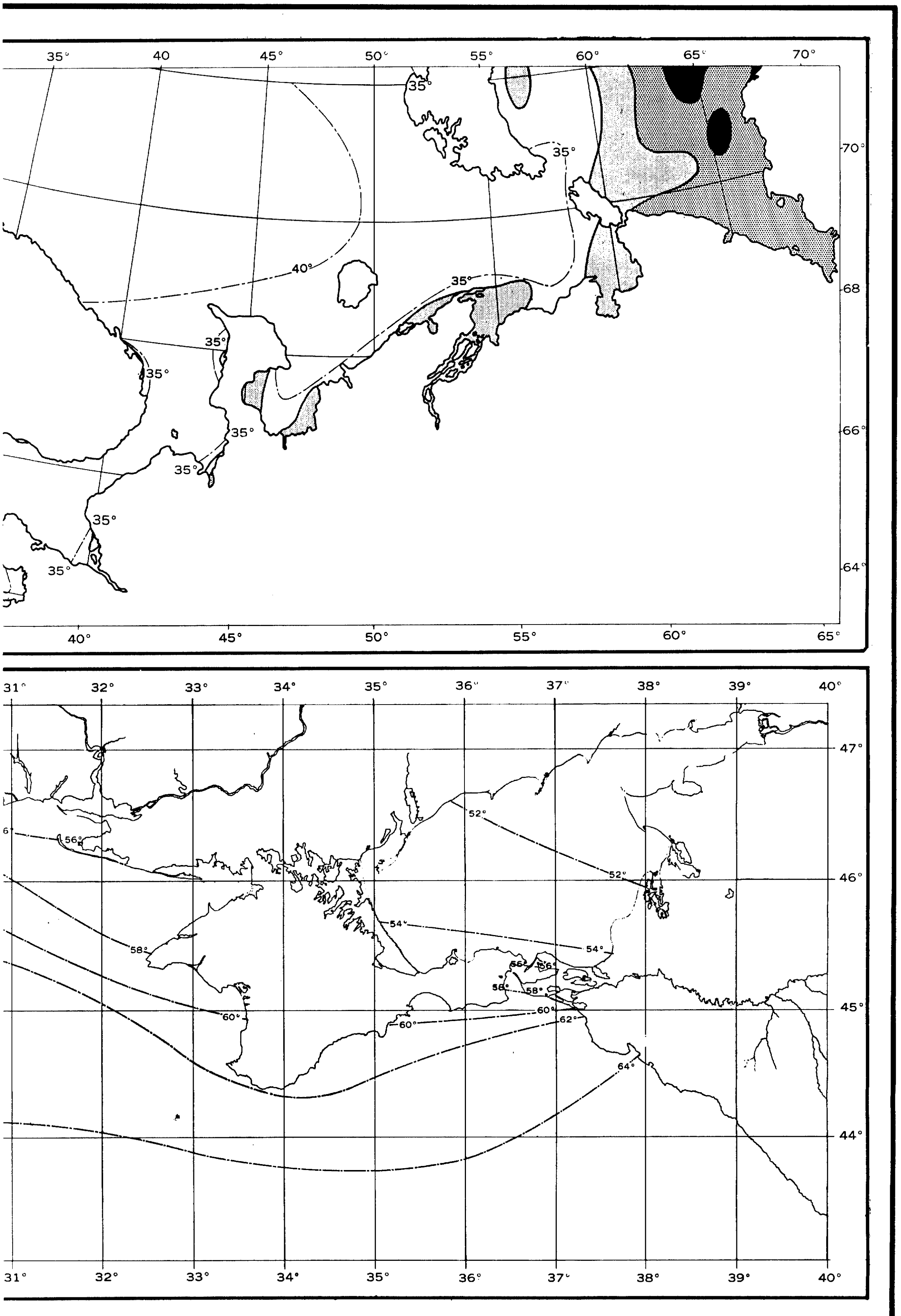
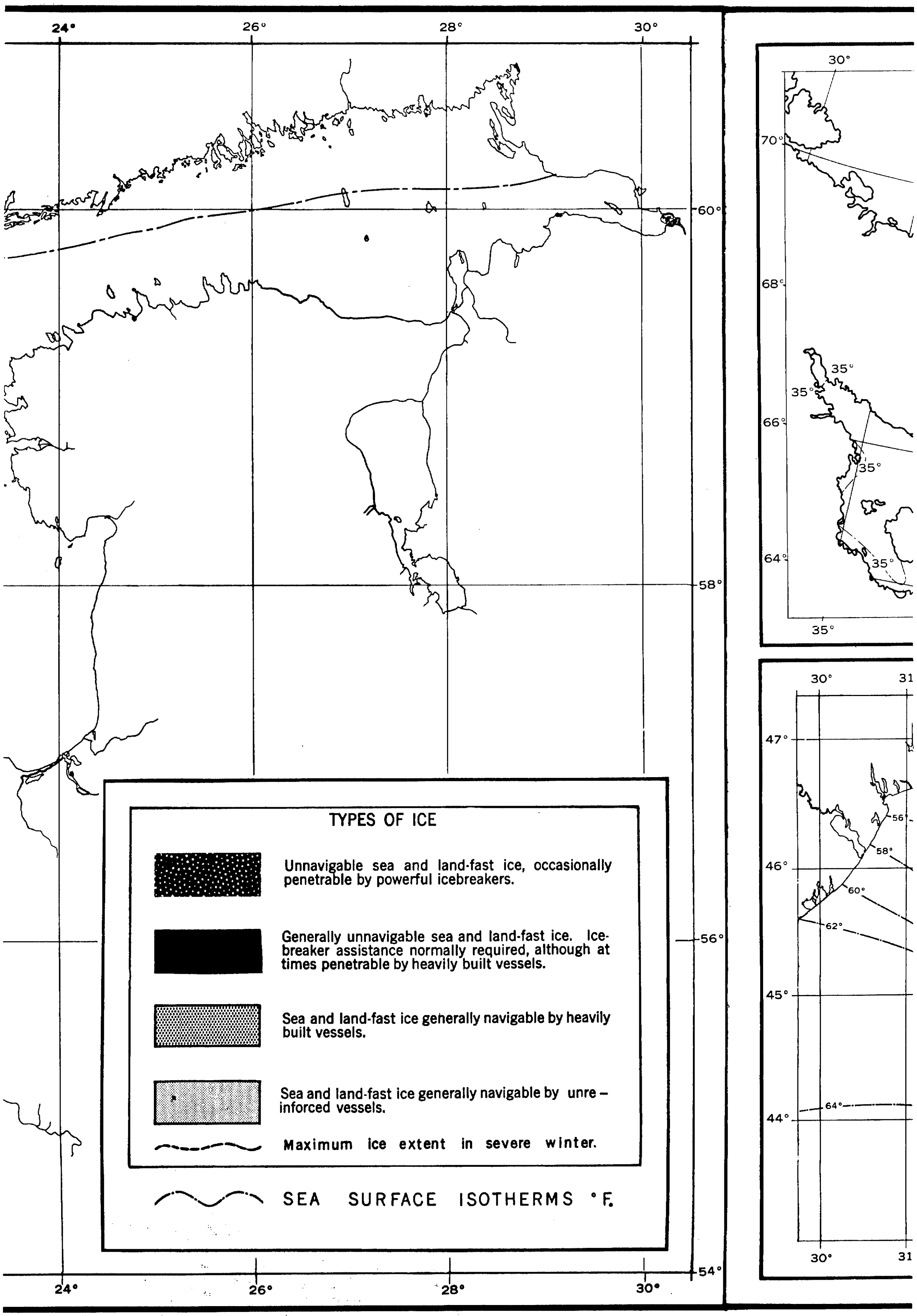

19°
20°
22°
24°
26°
60°
58°
56°
54°
50°
55°
55°
TYPES O
Unnavigable sea
penetrable by po
Generally unnavig
breaker assistanc
times penetrable
Sea and land-fast
built vessels.
Sea and land-fast
inforced vessels.
Maximum ice
SEA SURF

FIGURE III-21
SEA SURFACE TEMPERATURE AND ICE, OCTOBER
JANIS 40
~~CONFIDENTIAL~~




24°
26°
28°
30°
60°
58°
56°
54°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
70°
68°
66°
64°
35°
47°
46°
45°
44°
56°
58°
60°
62°
64°
31

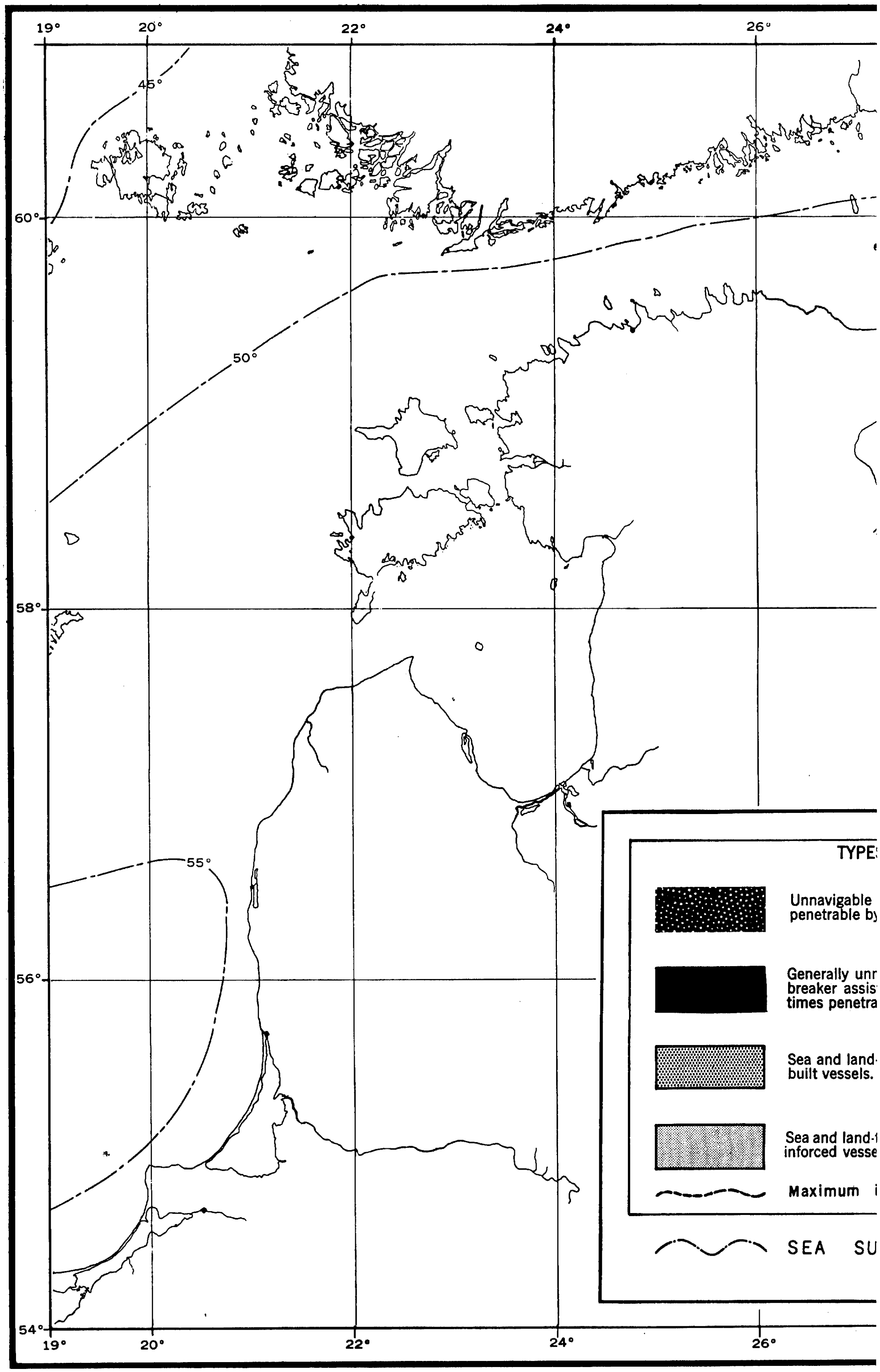

19°
20°
22°
24°
26°
45°
50°
55°
60°
58°
56°
54°
TYPE
Unnavigable
penetrable b
Generally unr
breaker assis
times penetra
Sea and land
built vessels.
Sea and land-
inforced vesse
Maximum
SEA SU

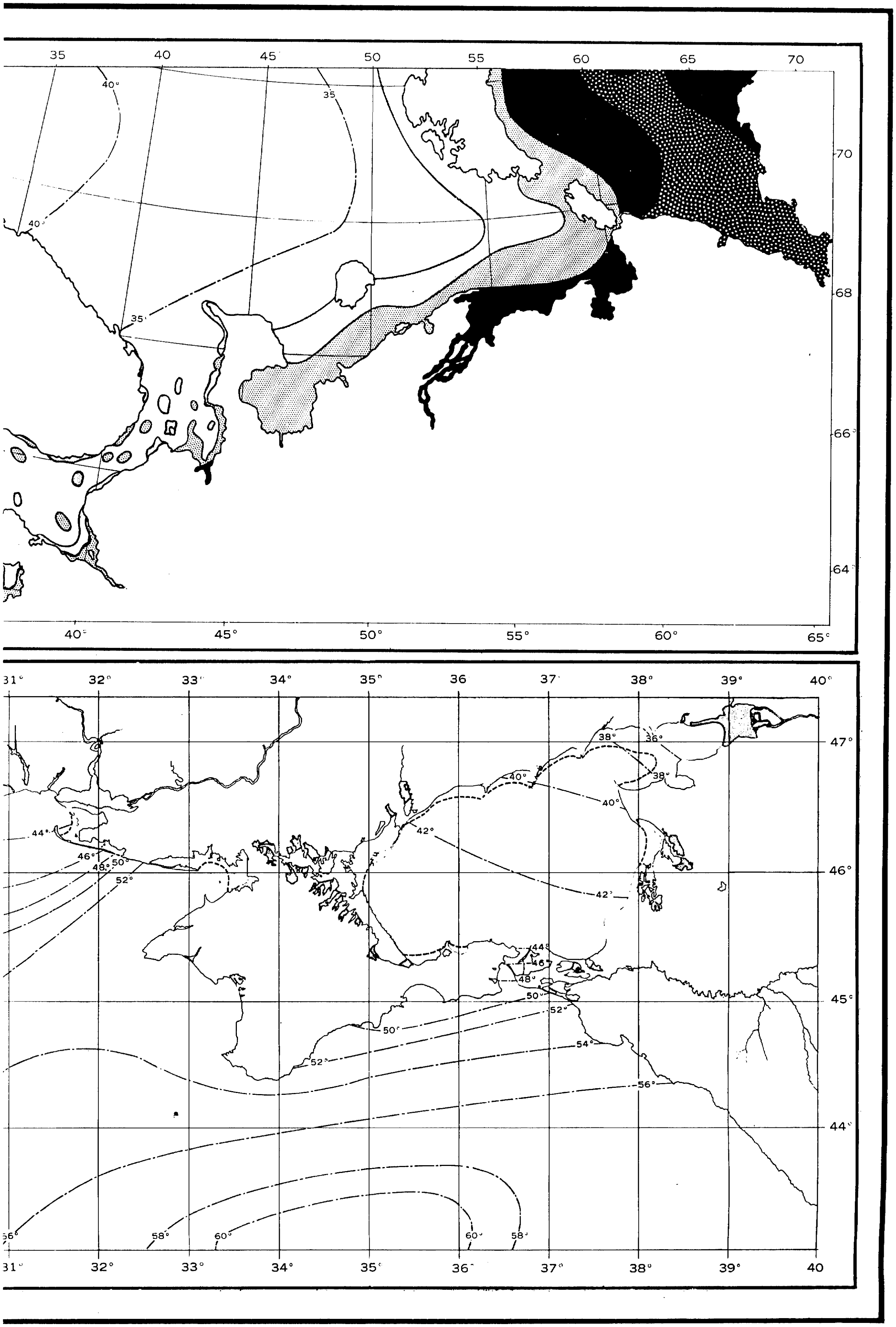
FIGURE III-22

SEA SURFACE TEMPERATURE AND ICE, NOVEMBER

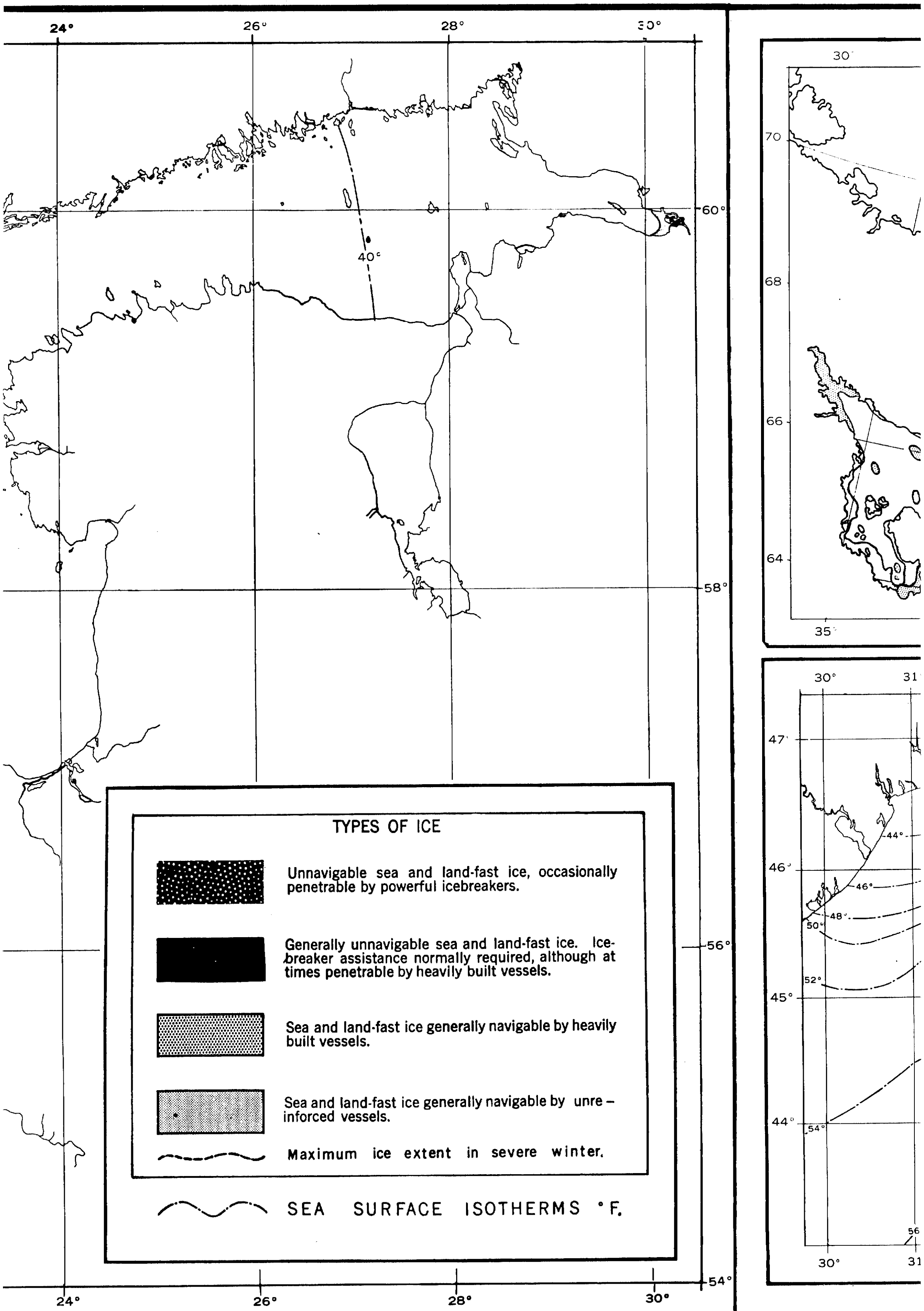
JANIS 40

~~CONFIDENTIAL~~

(1)



9 [redacted]


24°
26°
28°
30°
60°
58°
56°
54°
40°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre – inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F.
30°
70
68
66
64
35°
31
47°
46°
45°
44°
44°
46°
48°
50°
52°
54°
56

(3)

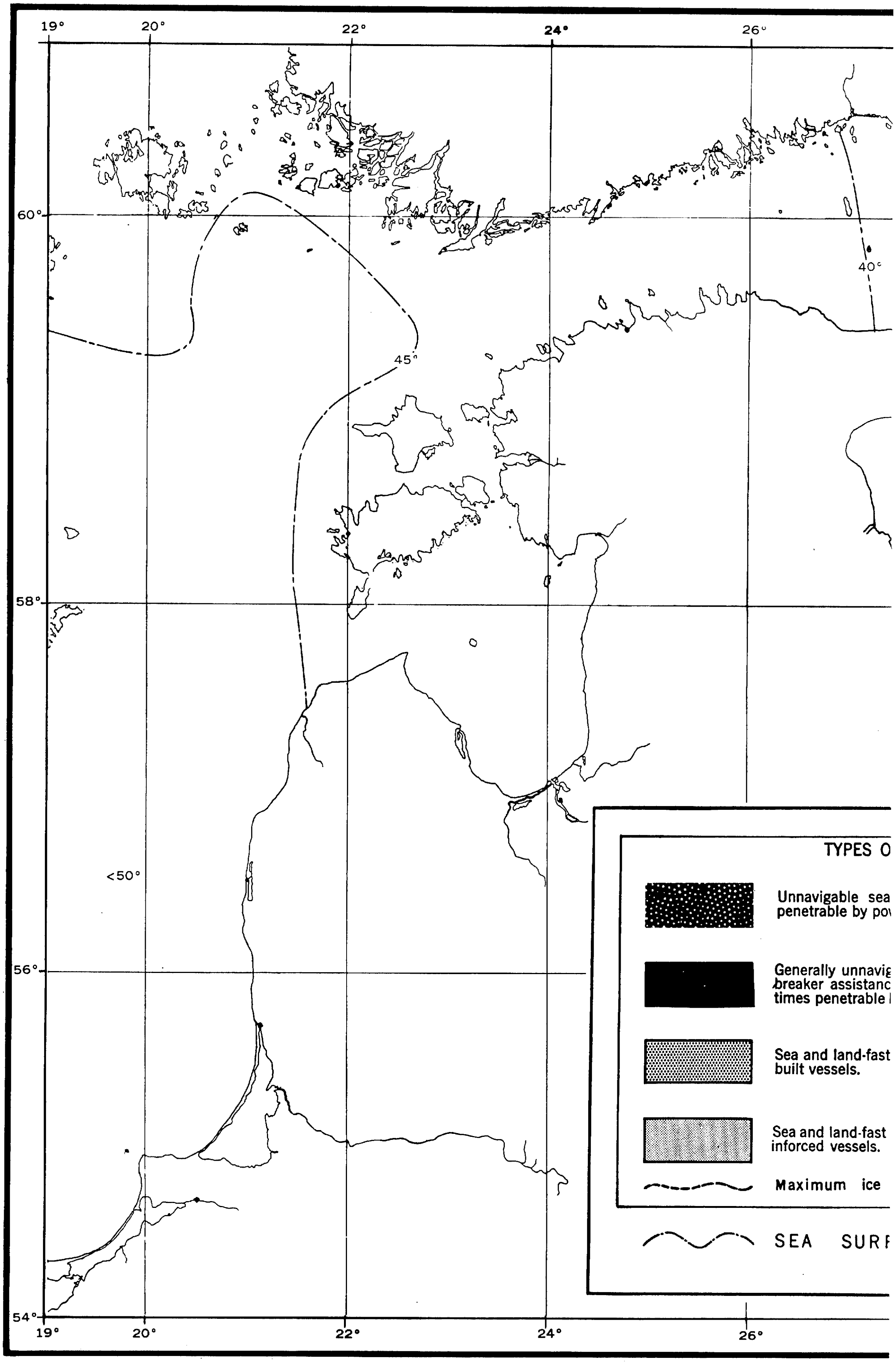
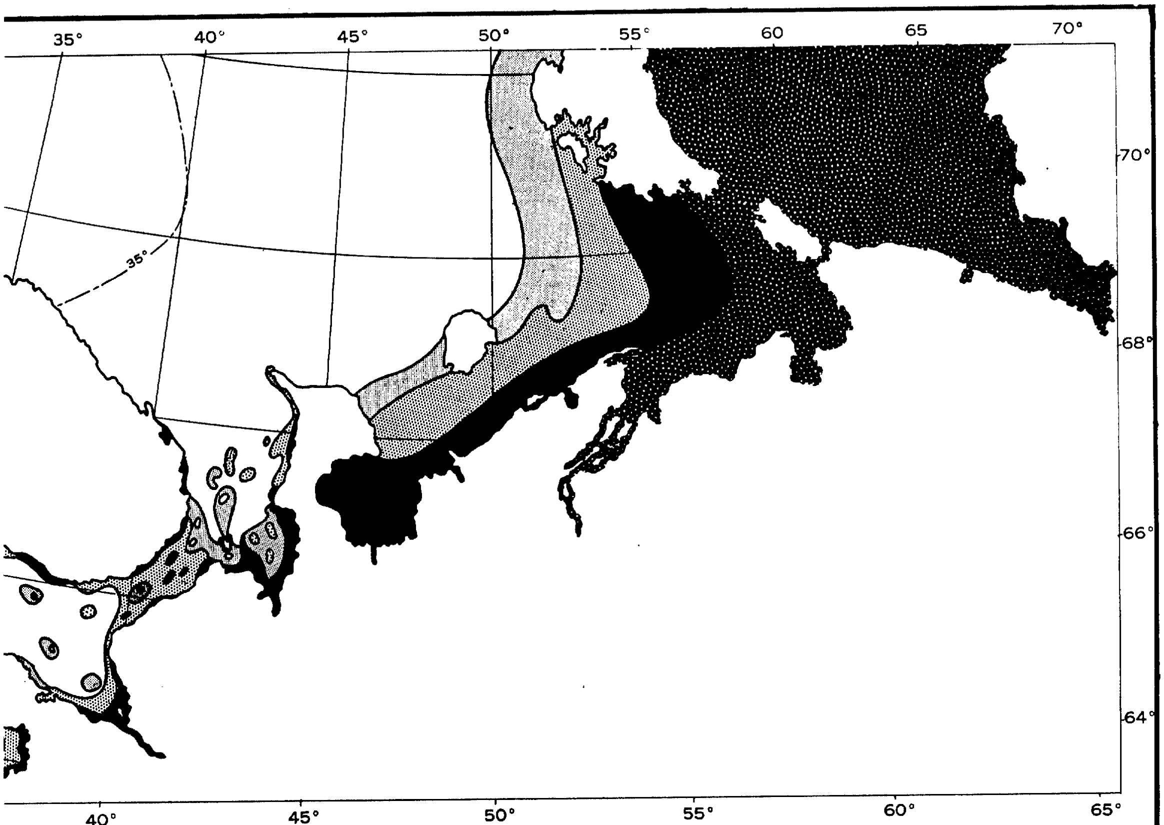
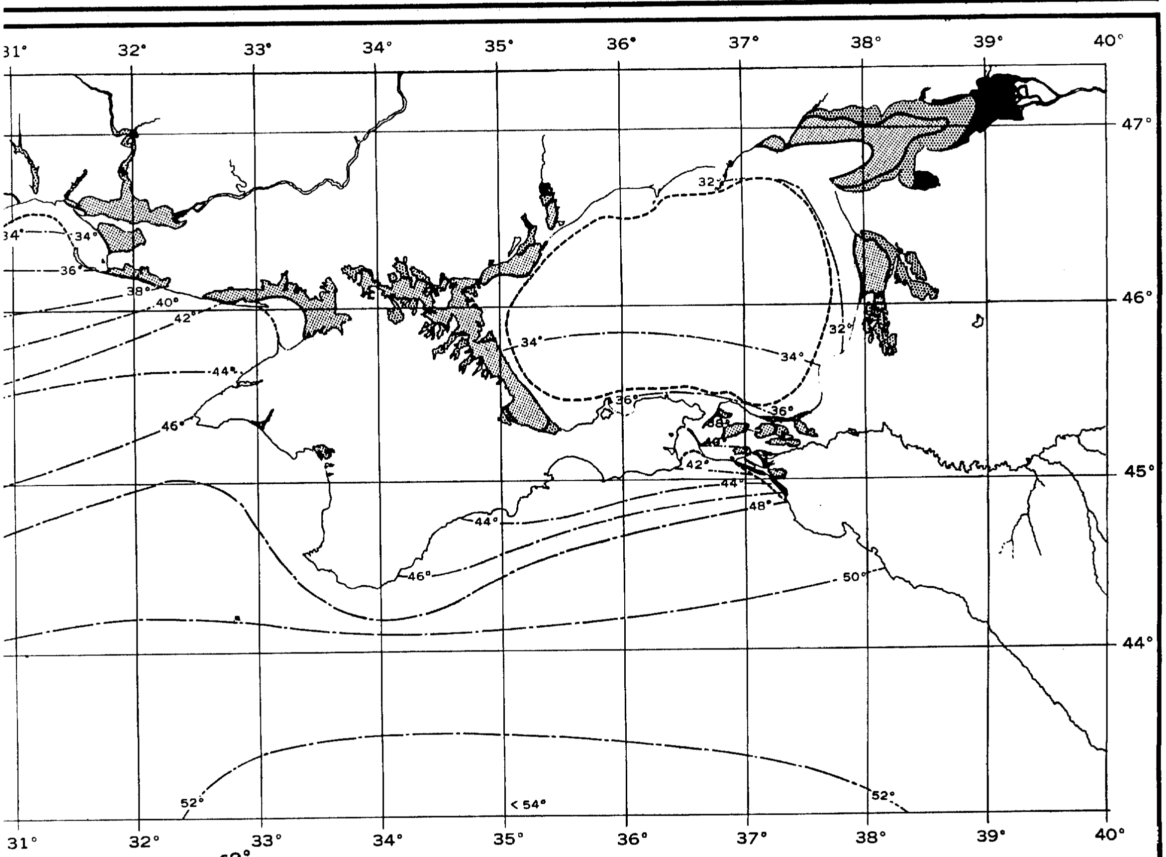

19°
20°
22°
24°
26°
60°
58°
56°
54°
40°
45°
<50°
TYPES O
Unnavigable sea
penetrable by po
Generally unnavig
breaker assistanc
times penetrable
Sea and land-fast
built vessels.
Sea and land-fast
inforced vessels.
Maximum ice
SEA SURF

FIGURE III-23
SEA SURFACE TEMPERATURE AND ICE, DECEMBER
JANIS 40
~~CONFIDENTIAL~~

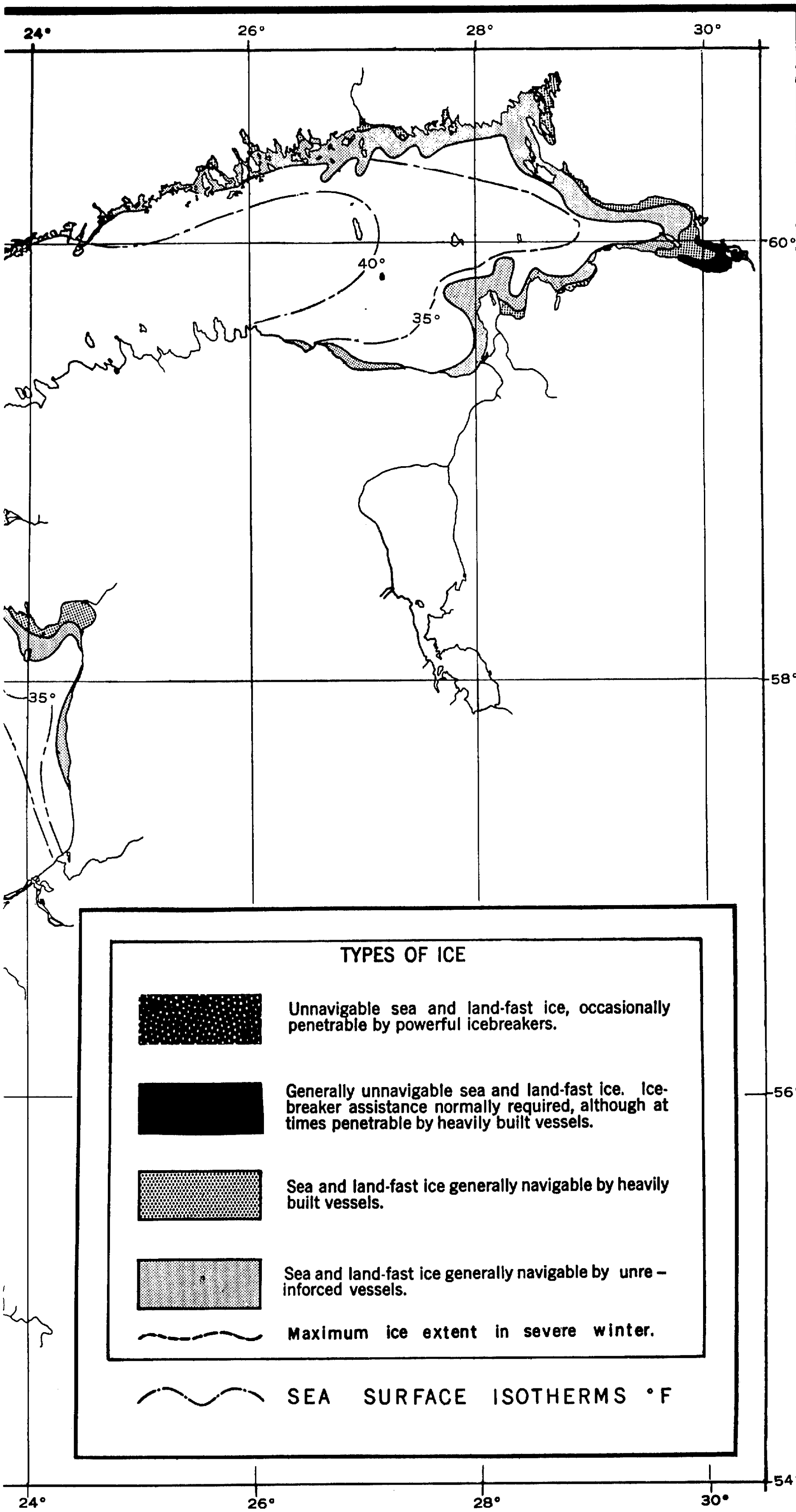
7

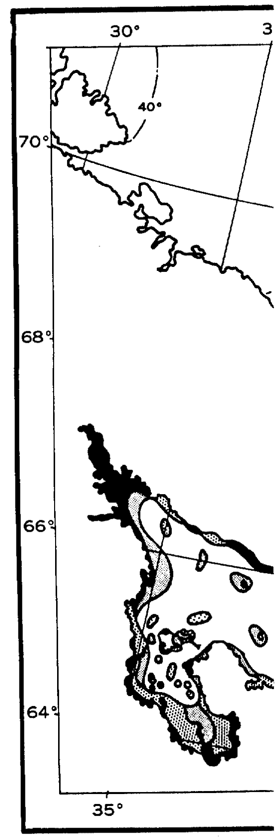


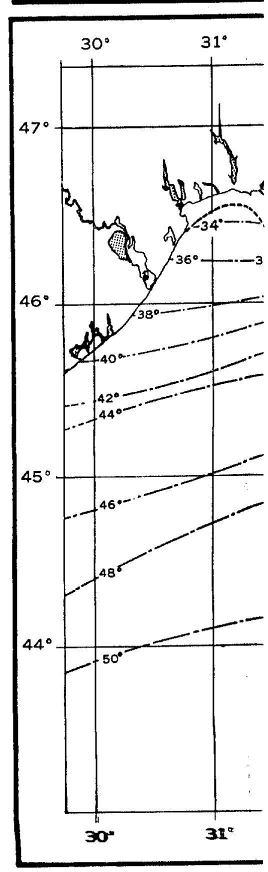


9

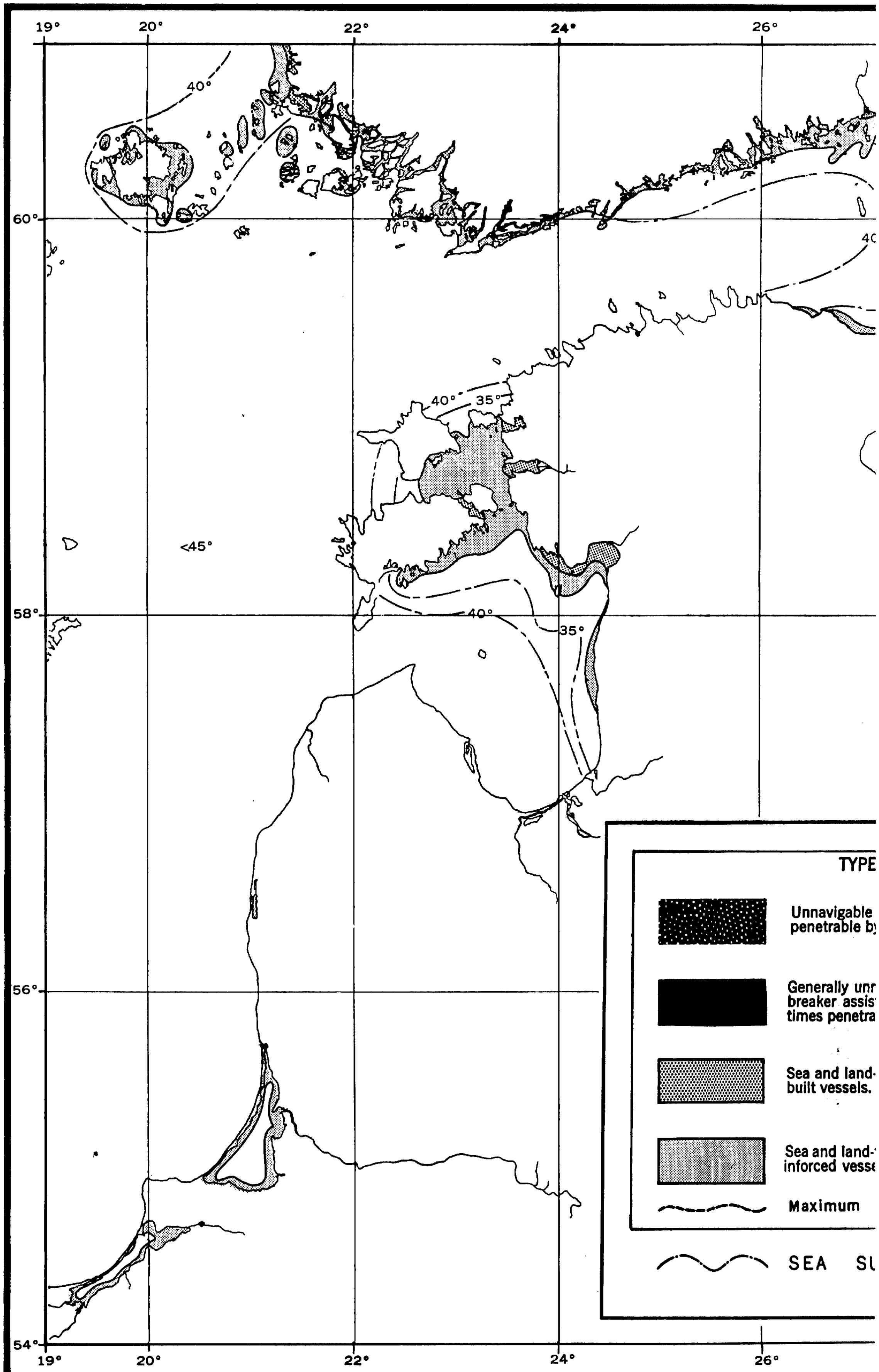
[redacted]


24°
26°
28°
30°
60°
58°
56°
54°
40°
35°
35°
TYPES OF ICE
Unnavigable sea and land-fast ice, occasionally penetrable by powerful icebreakers.
Generally unnavigable sea and land-fast ice. Ice-breaker assistance normally required, although at times penetrable by heavily built vessels.
Sea and land-fast ice generally navigable by heavily built vessels.
Sea and land-fast ice generally navigable by unre-inforced vessels.
Maximum ice extent in severe winter.
SEA SURFACE ISOTHERMS °F


30°
40°
70°
68°
66°
64°
35°


30°
31°
47°
46°
45°
44°
34°
36°
38°
40°
42°
44°
46°
48°
50°

(3)


19°
20°
22°
24°
26°
60°
58°
56°
54°
40°
35°
<45°
TYPE
Unnavigable
Generally
Sea and land-
built vessels.
Sea and land-
Maximum
SEA

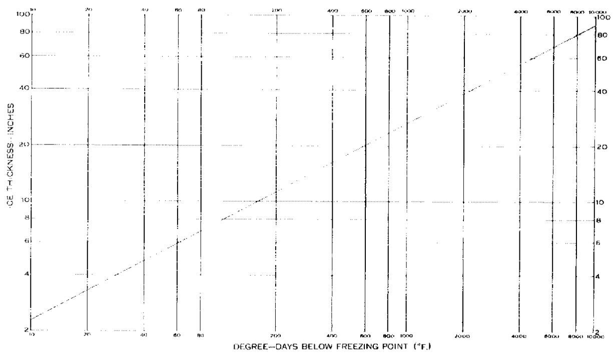


FIGURE III - 24. *Rate of formation of sea ice.*

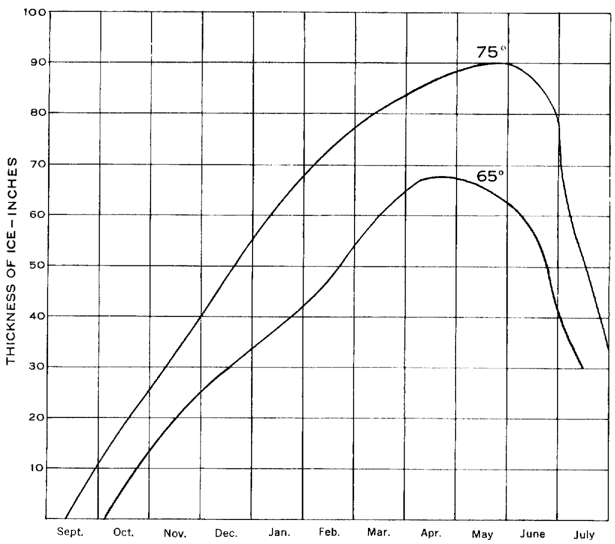


FIGURE III - 25. *Annual history of sea ice in typical harbors at latitudes 65° N and 75° N.*

The rate at which sea ice melts is greater than the rate of formation, owing to its cellular structure. The zones of entrapped frozen brine of lower freezing point thaw first, and the resulting porous mass has much greater surface to be acted on by surrounding air and water above the melting point.

(b) Strength of ice.—The *compressive strength* of fresh-water ice depends somewhat upon the rate at which stress is applied; it is usually given as around 420 pounds per square inch. Sea ice has about half the strength of fresh-water ice. The *tensile strength* of ice is about one-third its compressive strength.

FIGURE III-26 gives the thickness of ice capable of supporting landings by aircraft of various weights, fitted with skis. For wheeled aircraft the thickness should be 20% greater.

(c) Solidity of ice.—Unlike ice formed in lakes and rivers, which are used as roads in the winter, the areas of sea ice indicated on FIGURES III-12 and III-13 are not necessarily continuous and unbroken. Wind, tides, thermal contraction, and currents cause cracks in the sea icefields even though the open water is at the freezing point, and broken pieces pile up in hummocks, so that the icefields represent as serious an obstacle to passage by foot or vehicle as by ship. For example, only in the most severe winters is it possible to cross the Gulf of Finland (801) on foot.

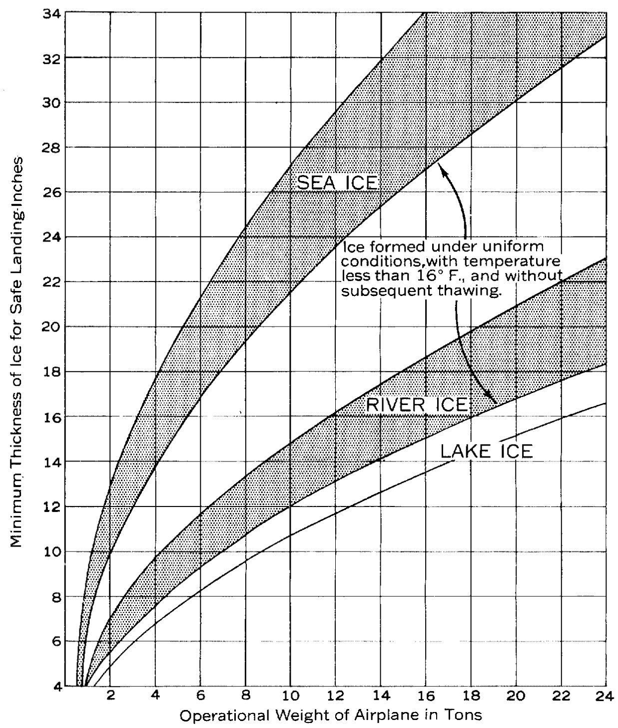


FIGURE III - 26. *Minimum thickness of ice required for airplane landings.*

(d) Drift of ice.—The influence of wind on ice, combined with the deflecting force of the earth's rotation, causes it to drift in open seas approximately 30° to the right of the direction of the wind, or roughly, along the isobars of the weather map with the high to the right. The velocity of ice drift is from 1.4% to 2.4% of the wind velocity, with the higher values in the early winter and the lower values more likely later.

(3) Variation with depth

The variation of sea water temperature with depth is discussed in Topic 33, D.

B. Salinity and density

(1) Horizontal distribution

FIGURES III-27 to III-29 give mean annual surface salinities for the coastal sectors covered in this report. FIGURES III-30 to III-32 show the mean density of the surface waters for each quarter of the year.

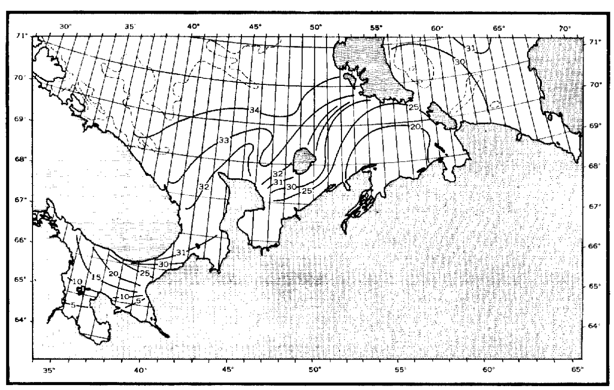


FIGURE III - 27. *North Coastal Sector, average autumn surface salinity in parts per thousand.*

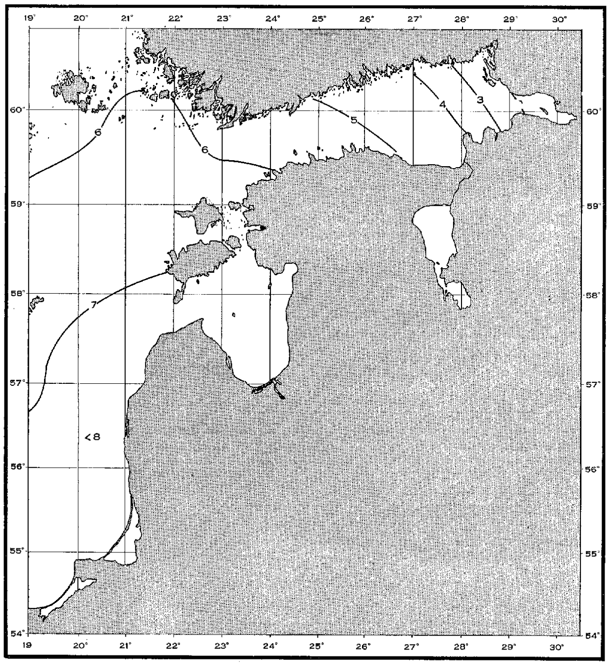


FIGURE III - 28. *West Coastal Sector, average annual surface salinity in parts per thousand.*

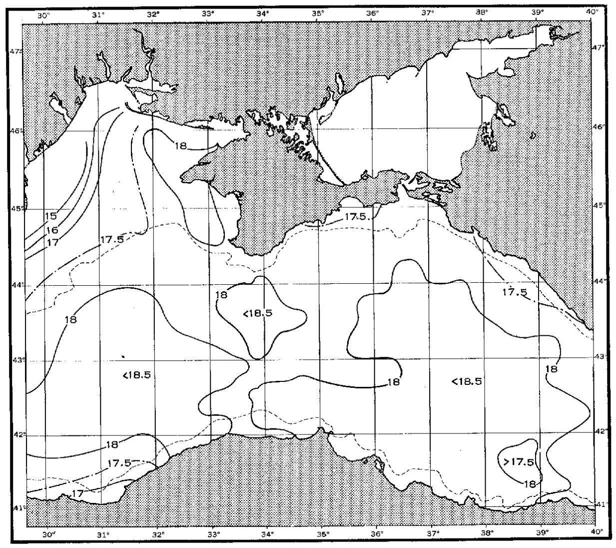


FIGURE III - 29. *South Coastal Sector, average annual surface salinity in parts per thousand.*

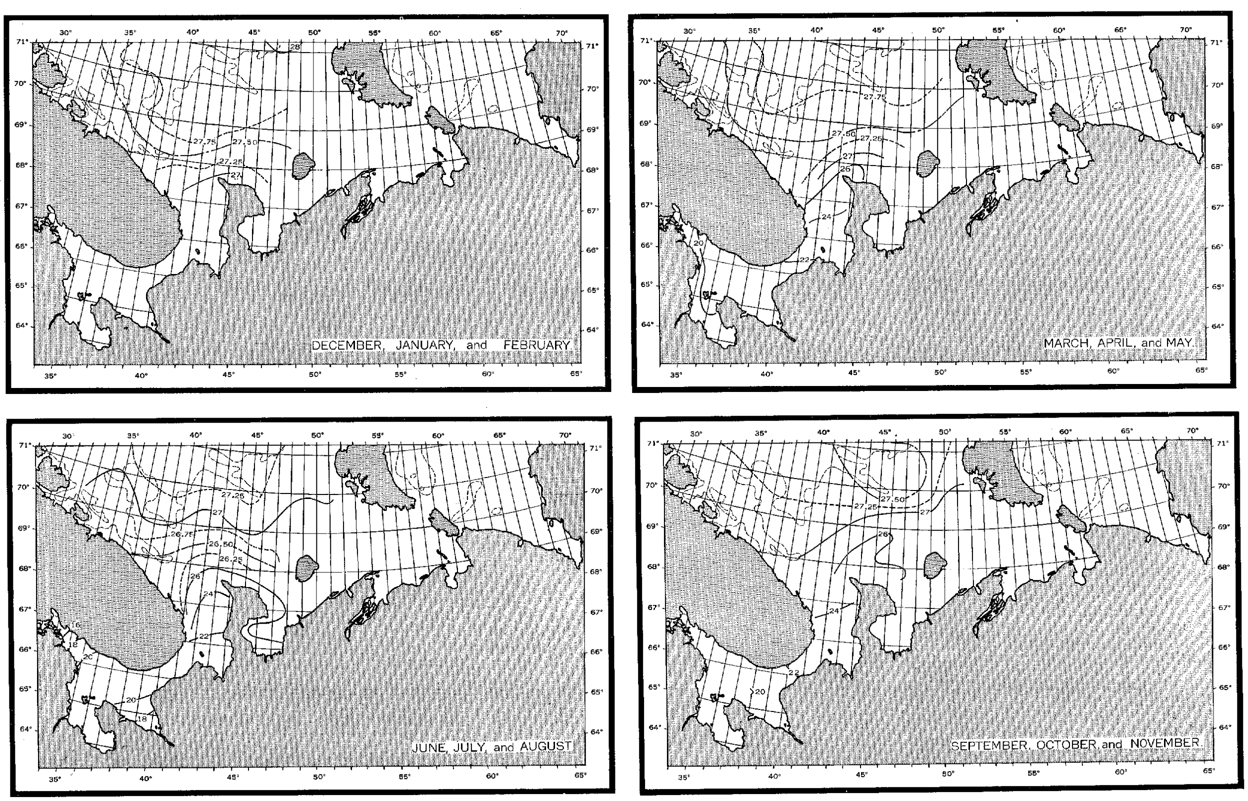


FIGURE III - 30. *North Coastal Sector, surface density.*
(A sea surface density value of 26.25 means specific gravity of 1.02625.)

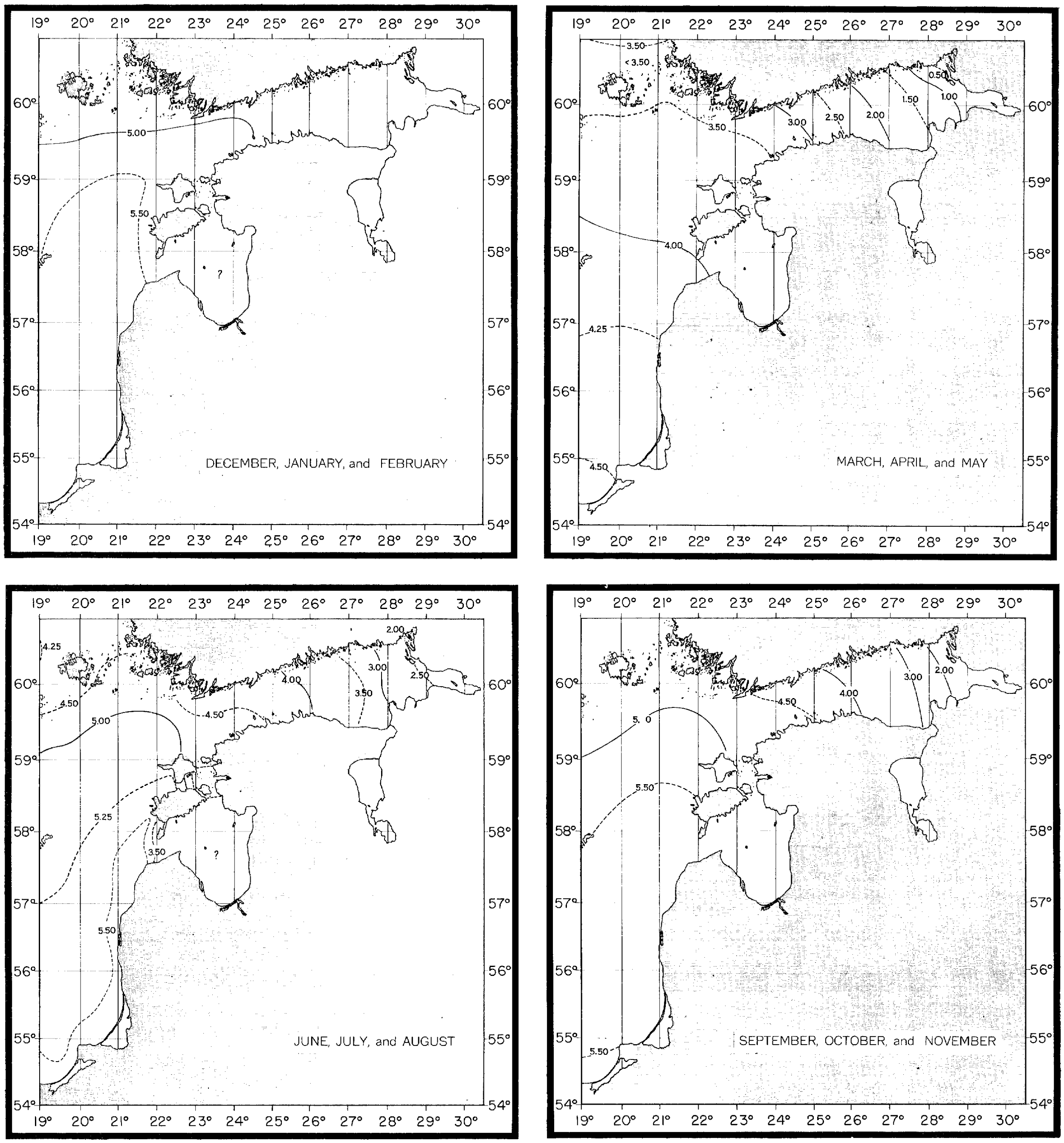


FIGURE III - 31. *West Coastal Sector, surface density.*
(A sea surface density value of 26.25 means specific gravity of 1.02625.)

(2) Vertical distribution

(a) General.—Vertical distribution of density and salinity at various significant localities of the region are discussed in Topic 33, D.

(b) Dead water.—The phenomenon of *dead water* occurs when a great variation in density is present in the surface waters, with the sharpest gradient at keel depth. Under these conditions a large fraction of the propulsive energy of a vessel is absorbed in the production of internal waves in the density boundary, and low-speed vessels such as sailing vessels and tugs with tows are impeded and may even lose steerage way.

Dead water, in a mild form, has been observed at various regions along Murmanskiy Bereg (Murman Coast) (311) near melting ice or river mouths. It may also occur at similar localities in the Black Sea (901).

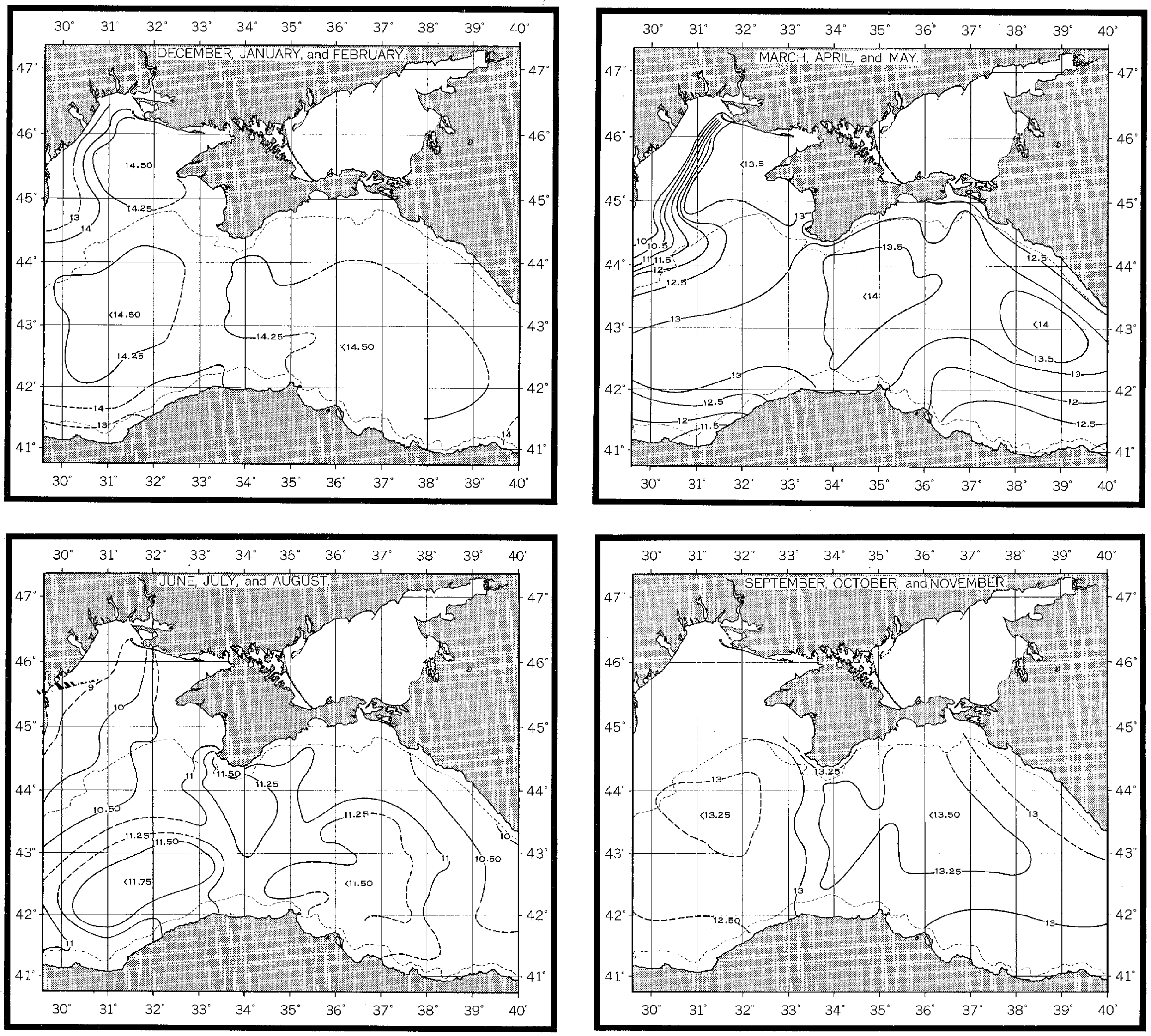


FIGURE III - 32. *South Coastal Sector, surface density.*
(A sea surface density value of 26.25 means specific gravity of 1.02625.)

C. Transparency and color

(1) General

(a) Transparency.—Transparency of sea water is generally expressed by a number which represents the depth in meters at which a white painted disk 30 centimeters in diameter can no longer be seen. The figure is therefore higher for increasing transparency.

In general, sea water is more transparent in winter than in summer, more transparent offshore than near shore, and (near shore) more transparent at high water than at low water.

(b) Color.—The basic color of sea water is blue. Near shore, plant growth adds a yellow component, which results in a green color. Silt carried down by rivers or stirred up by wave or current action may contribute brownish colors while an abundance of certain kinds of monocellular plants may result in a brown or red color.

(2) Specific areas

(a) North Coastal Sector.—The relatively warm water of the Barents Sea (1), which has its origin in the Gulf Stream, is characterized by high transparency (mean 10 to 12, maximum 22 to 27) and an intense dark blue color. The coastal waters are greenish with a yellow undertone and are much less transparent, having a mean value of 7 to 9, decreasing to 2 to 4 at the leads of inlets. The mixtures are bluish green and greenish with intermediate transparency.

To the west of Novaya Zemlya (2) sharp boundaries can be distinguished between the blue Gulf Stream water with transparency 19 to 20 and the greenish Barents Sea water. In the southeast Barents Sea (1), near Ostrov Kolguyev (46), off river mouths, and over shoals, the water is muddy green; offshore toward Proliv Yugorskiy Shar (23) it is yellow-green and muddy. Near Ostrov Vaygach (27) it is described as "muddy as ditch water."

In the northern Beloye More (White Sea) (109) the water is bluish green with a transparency of 10; farther south it becomes a turbid leaden color and is less transparent. The Mezenskaya Guba (65) is muddy yellow from bottom silt, and the other gulfs are various shades of green.

(b) West Coastal Sector.—The central waters of the Gulf of Finland (801) have been described as gray-green, yellow-green, and green. However, the predominant color, May through November, is essentially green. The water has a mean transparency of 11. The color of the inshore waters of the Gulf of Finland (801) is described as brownish yellow, yellow, and brown. The brown coloration results from the discharge of silt from the rivers draining into the Gulf. The yellow and yellow-brown water has a mean transparency of 10, while the minimum transparency, recorded during the spring flood period, is 2 to 3.

The waters of the Baltic (890) usually appear green with a mean transparency of 13 to 14. It has been noted that in the Baltic (890) waters described as yellow or gray-green are usually more transparent than those described as green.

(c) South Coastal Sector.—No data are available on the color of the water of the Black Sea (901). However, it may be assumed that, despite its name, the inshore waters are a shade of green, grading into typical blue indicating the depths in the central areas. During the late spring and early summer, the waters off river mouths will be discolored by silt brought down by spring freshets.

The mean transparency of the Black Sea (901) waters is 16. The central waters have a maximum of 28 to 30 and minimum 16 to 18. Off Odessa (905) in areas influenced by river discharge, the mean annual transparency is 10 and the minimum 1 to 2.

D. Sonar and diving conditions

(1) General

The employment of high-frequency sound transmitted through sea water is primarily dependent upon certain oceanographic conditions and the acoustic properties of the bottom. The oceanographic conditions include such variables as density gradients resulting from vertical temperature and salinity changes, sea state, wind force, and particulate matter in the water. Ordinarily the temperature gradient (decreasing with depth) is the principal cause of the density gradient (increasing with depth). Near river mouths or melting ice, the salinity gradient (increasing with depth) will also contribute to the density gradient. Where temperature inversions (temperatures increasing with depth) exist, vertical stability obviously is maintained by a salinity gradient. The acoustic properties of the bottom are dependent upon the type of sediments, whether the bottom is *mud, sand,* or *rock,* and the size and distribution of these sediments. For example, reverberations which tend to mask the echo are strong over a *rocky* bottom, while a *mud* bottom has the same characteristics as deep ocean. Bottom sediments are more fully discussed in Topic 34.

If the water is isothermal (no change of temperature with depth), the sound rays travel in an essentially straight line from the projector to the target and return. However, if there are density gradients the sound rays are bent or refracted, resulting in a decrease of effective range. If the temperature gradient is negative, the path of the sound beam is bent downward; if the temperature gradient is positive, the path of the sound beam is bent upwards. Thus, when the temperature gradients are present, a submarine can usually approach closer to the escort vessels and still avoid detection.

Refraction of the sound rays is also caused by changes in salinity. For example, if a layer of relatively fresh water overlies the more saline sea water, the rays from the sound gear are sharply refracted and the effective range decreased.

The change in ballast in diving to the best depth for evasion, and the possibility that the submarine may be able to maintain trim without use of motors or planes, or move away quietly, also depends on the subsurface density gradients. When diving through isothermal water, a submarine of 2,400 tons submerged displacement and a compressibility of approximately 2,000 pounds per one hundred feet will have to pump ballast to maintain trim at depth. However, if the temperature increases with depth, it will be necessary to pump, and conversely, a decrease in temperature with depth will necessitate flooding.

It is also important to know the salinity conditions in the submarine operating area. If the tanks are flooded on the surface with sea water which has a salinity value lower than that at the operating depth, it will be necessary to flood to maintain trim.

(2) Specific areas

(a) North Coastal Sector

1. Sonar conditions.—Well-developed vertical temperature gradients coupled with shallow, well-developed salinity gradients will greatly reduce sonar ranges in the Beloye More (White Sea) (109) during the summer months. A layer of low salinity surface water in Onezhskaya Guba (132) and Dvinskaya Guba (108) effectively reduces the action of the wind in vertical mixing resulting in the development of temperature gradients as shown in Figure III-33. In the open portions of the Beloye More

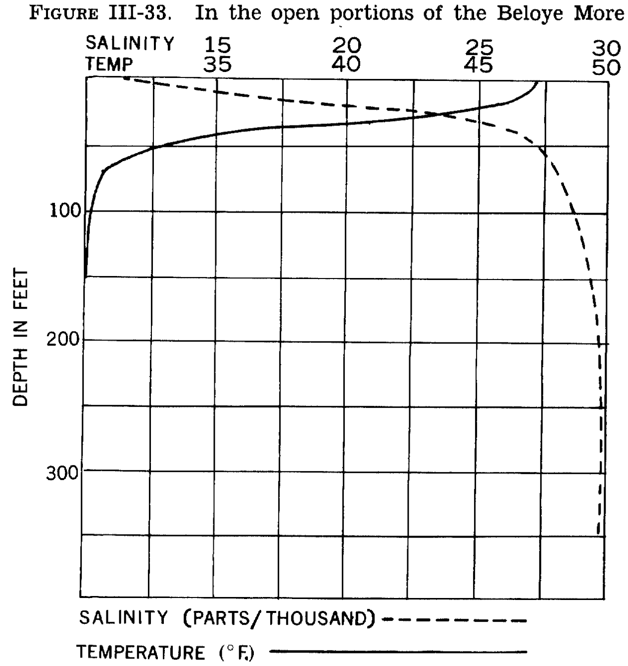


Figure III - 33. *North Coastal Sector, temperature salinity section Beloye More.*

(109) these vertical salinity gradients decrease in magnitude and disappear in the homogeneous, well mixed waters of the Gorlo (257). Periscope-depth ranges in these gulfs will usually be less than 1,000 yards in the summer months, the layer depth will be 40 feet or less, and the assured range will average 1,200 yards. In the open waters of the Beloye More (109) the periscope-depth range will increase to 2,000 yards, layer depth to 50 feet and the assured range to 1,400 - 1,600 yards. In the Gorlo (257),

with wind forces of 5 or less, the periscope-depth and assured ranges will average 2,000 yards or more, depending upon such variables as condition of the sonar gear, ship's speed, type of bottom sediments, etc.

Bottom sediments in the Beloye More (109) are predominantly mud (FIGURE III-48). Thus, when temperature gradients are not a limiting factor or are negative, range predictions will be similar to those for deep water (100 fathoms or more). Strong reverberations may be encountered over the rocky bottom covering portions of the Gorlo (257).

During July and August, the discharge from the Pechora (43) is warm water of low salinity (FIGURES III-18, III-19, and FIGURE III-27). The movement of this surface layer, flowing out over the colder, more saline waters of the Barents Sea (1), will result in well-developed vertical temperature and salinity gradients (FIGURE III-34). These

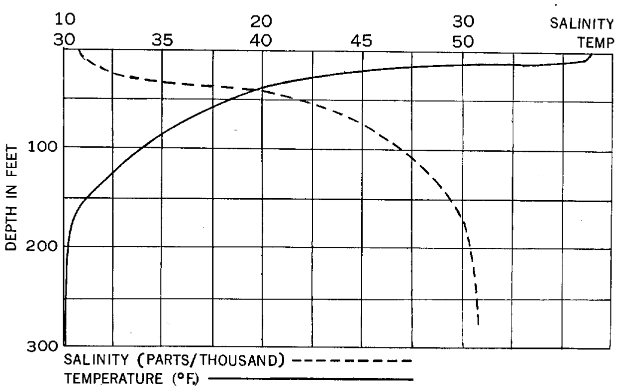


FIGURE III - 34. *North Coastal Sector, temperature salinity section off the Pechora.*

gradients, extending northwestward to the latitude of the southern tip of Novaya Zemlya (2) will decrease the periscope depth range to 1,000 yards or less. The layer depth, dependent upon the wind force, will vary between 30 and 50 feet, with a mean assured range of 1,400 yards. Moving offshore, north of the relatively fresh and warm discharge of the Pechora (43), the periscope-depth range will increase to approximately 1,500 yards, layer depth to greater than 50 feet and the assured range to 1,400 - 1,600 yards.

Predicted ranges may be reduced by reverberations from the downward refraction over the sand bottom, offshore from the estuary of the Pechora (43). Also, during the summer months, reverberations will be a factor in range prediction over the rocky area between the Pechora (43) and Cheshskaya Guba (49).

The coastal areas from Mys Kanin Nos. (55) to Proliv Karskiye Vorota (6) are usually icebound during the period from November to June. In the offshore areas of the Barents Sea (1), during the early fall and late spring months, well-developed temperature gradients are present. Periscope-depth range is usually long, 2,000 yards or more; layer depth 100 to 150 feet; and average assured range 1,500 yards. During the period of the winter months, the open waters of the Barents Sea (1) are well mixed to depths of 150 feet or more. Scattered records indicate temperature inversions do exist during this period, usually at depths greater than 300 feet. The deep isothermal layer will result in long ranges at all depths, usually in excess of 2,000 yards.

The low temperatures in the shallow areas of the Beloye More (White Sea) (109) and the Barents Sea (1) undoubtedly prohibit the existence of such noisemaking organisms as the snapping shrimp. However, other biological noises are undoubtedly present. Background noise confusing to the sonar operator may result from fish feeding on the molluscan fauna in the shallow waters, from the various schools of fish, the seals, and the porpoises. Spurious echoes may come from the numerous whales reported from these areas. Whales and seals both make sounds much like pinging while other fish noises have been described as groans, squeaks, and whistles or compared with drumming, mewing, cooing, rattling, creaking of hinges, or tapping on wood.

2. DIVING CONDITIONS.—FIGURE III-35 illustrates the ballast predictions in the Beloye More (109) for dives from periscope depth to 200 feet and from periscope depth to 400 feet. During the summer months, although well-developed temperature gradients do exist, the low surface temperatures (55° F. or less) cause the temperature-depth curve to lie on the area of the submarine bathythermograph card where the isoballast lines are widely spaced. For this reason, the required ballast changes are considerably less than those for waters with similar tempera-

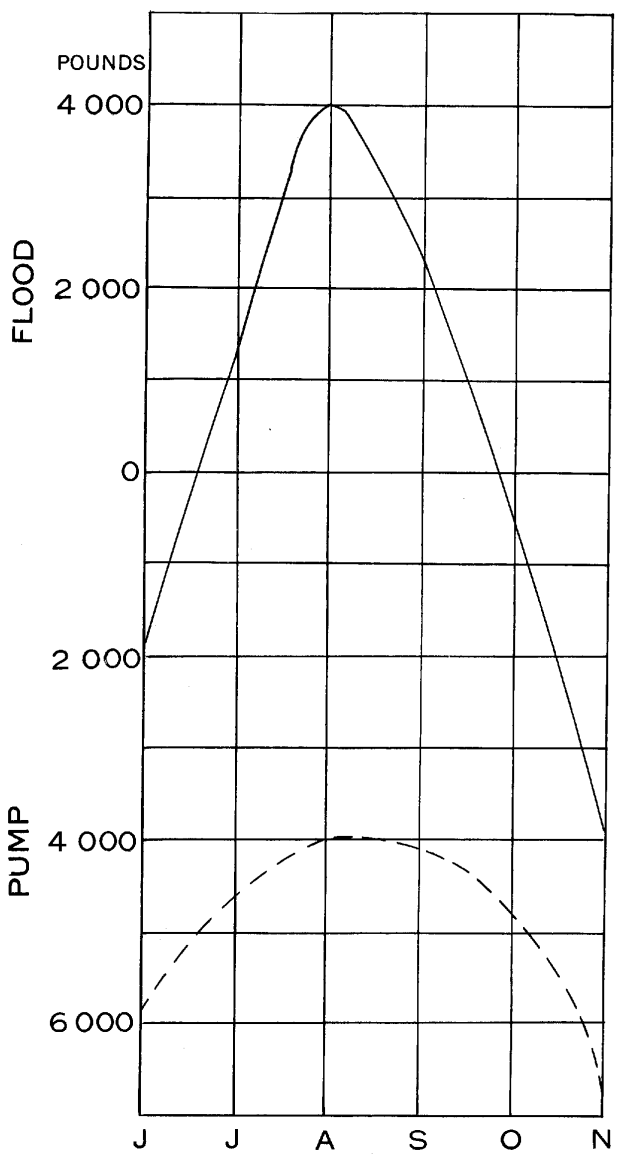


FIGURE III - 35. *North Coastal Sector, ballast predictions.*

ture gradients but with higher surface temperatures. Compare FIGURE III-35 with FIGURE III-39 for the west coastal sector. The pronounced salinity gradients in this area will also influence ballast predictions, necessitating positive ballast increments of 10,000 to 20,000 pounds.

When operating in the area between the Pechora (43) and Novaya Zemlya (2), large ballast increments, resulting from the increase in salinity and the decrease in temperature with depth, will be necessary. During the summer months, July, August, and September, when this area is free from ice, it will be necessary to flood from 10,000 to 20,000 pounds during the dive from periscope depth to 500 feet. Offshore, the salinity and temperature gradients decrease in magnitude, thus decreasing the required change in ballast with change in depth. The available vertical temperature and salinity records are inadequate to calculate quantitative ballast changes. Balancing will usually be possible in the Barents Sea (1) during the months of July, August, and September.

(b) West Coastal Sector

1. SONAR CONDITIONS.—The waters of the Gulf of Finland (801) are characterized by, a) wide seasonal variations in surface temperature (FIGURE III-12 to III-23), b) strong vertical temperature gradients inshore (FIGURE III-36B), with depth of the layer increasing in the central waters of the gulf (FIGURE III-36A), c) temperature inversions (increase in temperature with depth) in the spring months (FIGURE III-36), and short periods of isothermal water in the late fall and spring months because of the extensive ice coverage in the winter (FIGURE III-36).

During the summer months, the periscope-depth range in the inshore waters of the Gulf of Finland (801) will be short, usually less than 1,000 yards, increasing in the central waters of the gulf to an average range of 2,000 yards. During the month of August, the minimum range, as predicted from the temperature trace (FIGURE III-36B), will be less than 800 yards. In the protected coastal waters the layer depth will average 30 feet with an assured range of less than 1,200 yards. FIGURE III-36A illustrates the vertical temperature distribution for the waters in the central portion of the gulf. During the summer, the layer depth will average 50 feet and the assured range 1,200-1,400 yards.

With the strong downward refraction resulting from the decrease in temperature with depth, bottom types will have an effect on the range as predicted from the temperature trace. Due to the rocky bottom, reverberations, tending to mask the echo, can be expected along the entire northern coast of the gulf. With the exception of the rocky patches, shown on FIGURE III-49, the bottom in the central part of the gulf is *sand and mud,* resulting in a degree of reverberation intermediate between *mud* and smooth *sand.*

The decrease in surface temperature, September to December, will result in an increase in the density of the surface water and vertical convection currents. These convection currents, mixing the cooler surface waters with the warmer subsurface waters, will aid the wind in the process of vertical mixing and will increase the periscope-depth range, layer depth, and the assured range.

Once isothermal conditions exist, as during the month of November (FIGURE III-36A), the periscope-depth and assured ranges will, with a wind force of 5 or less, usually exceed 2,500 yards. This condition will continue in areas free of ice until the temperature inversions appear. Inversions will result in upward refraction of the sound beam and a decrease in the sonar range below layer depth. FIGURE III-37 illustrates the change of assured range with depth as predicted from the vertical temperature distribution for April (FIGURE III-36B).

FIGURE III-38 illustrates the vertical temperature distribution in the Baltic (890) for several months of the year. With summer temperature conditions as shown, the periscope-depth range will vary between 800 and 2,500 yards. During the periods of calm, warm weather, strong, shallow gradients will reduce the periscope-depth range to less than 1,000 yards, increasing to a maximum of about 2,500 yards as the wind velocity increases and vertical mixing takes place. The layer depth will vary between 30 and 80 feet, with assured ranges of 1,000 to 1,600 yards.

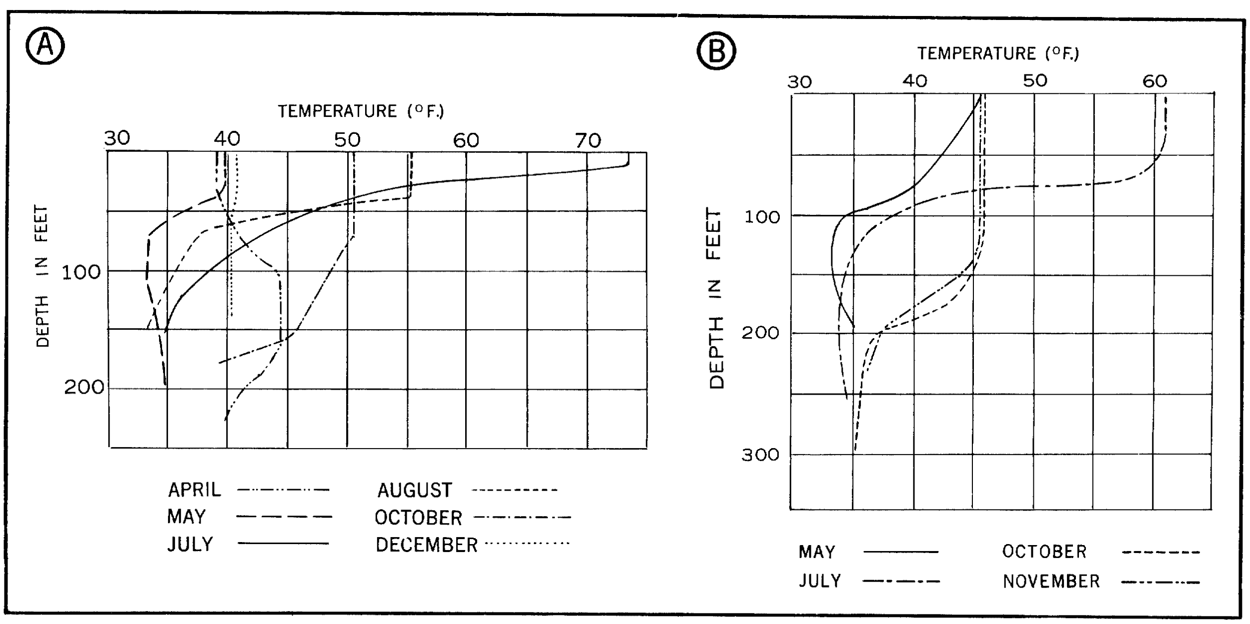


FIGURE III - 36. *West Coastal Sector, vertical temperature distribution.*
A. North shore of the Gulf of Finland.
B. Central waters of the Gulf of Finland.

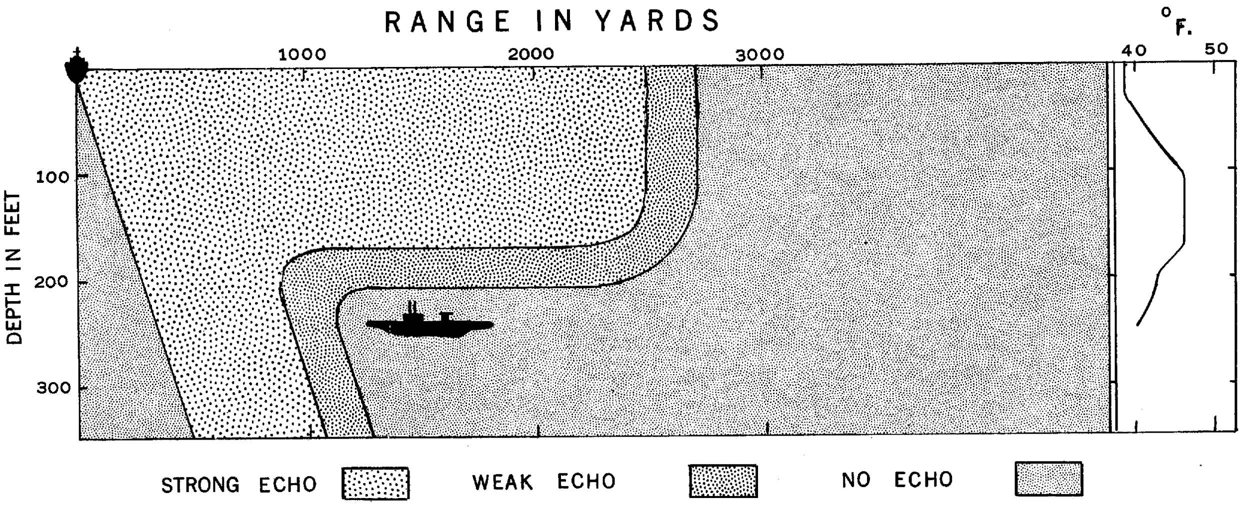


FIGURE III - 37. *West Coastal Sector, diagrammatic representation of predicted range at depth for positive thermal gradient.*

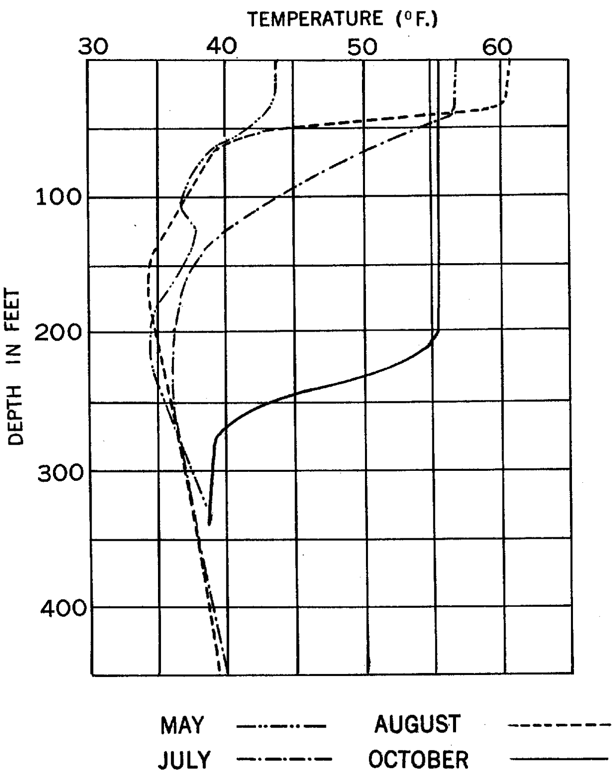


FIGURE III - 38. *West Coastal Sector, vertical temperature distribution in the Baltic Sea.*

In the Baltic (890) during the fall months, October through December, layer depth will increase to 150 feet with the assured range increasing to 1,600 yards. For a brief period, during midwinter, the temperature does not change with depth, resulting in little or no refraction and long ranges at all depths. As in the Gulf of Finland (801), temperature inversions appear in the spring, causing conditions similar to those illustrated in FIGURE III-37.

Salinity gradients, protecting a submarine from echo-ranging surface craft, will be found in the area immediately west of Nevskaya Guba (812) (FIGURE III-38) and in the inshore waters during periods of rainfall and the resultant drainage of fresh water into the Gulf of Finland (801). There is a gradual increase in mean salinity values of the surface waters (FIGURE III-28), moving westward from the mouth of Nevskaya Guba (812) (2 parts per thousand) to the eastern limits of the Baltic (890) (7 parts per thousand). The deeper waters of the Gulf average 6.5 to 7 parts per thousand below 150 feet.

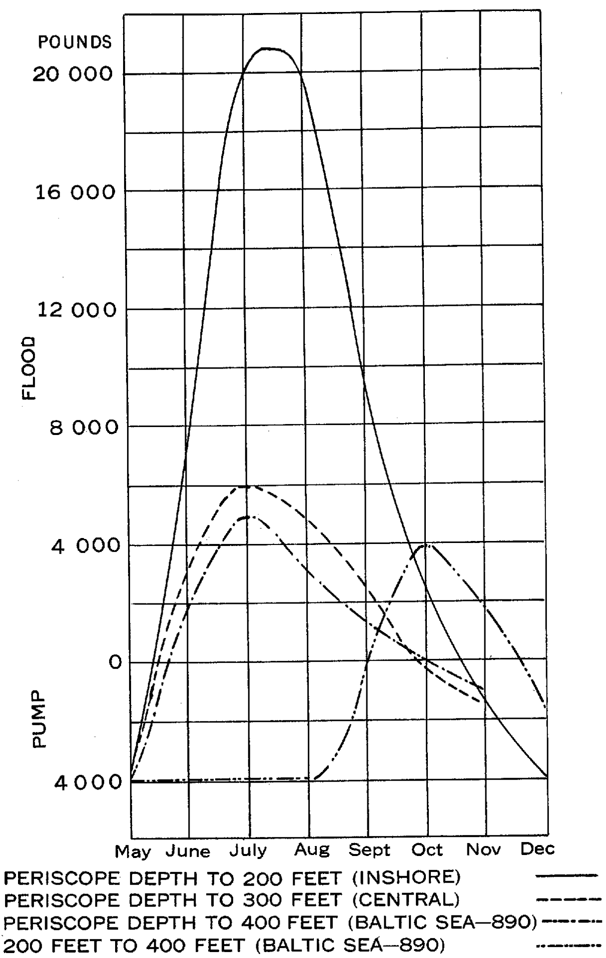


FIGURE III - 39. *West Coastal Sector, ballast predictions for the Gulf of Finland.*

The majority of organisms responsible for the various crackling, grunting, and whistling sounds reported as background noise are limited to areas warmer than 52° F. The various species of snapping shrimp and fish such as croakers, toadfish, sea robin, and hogfish will not be found in the Baltic Sea (890) and the Gulf of Finland (801). However, the background noise level may be raised by the noises made by other species of fish present in the Baltic Sea (890) and by these same species, and others, feeding on the relatively abundant molluscan fauna in the shallow waters of the Baltic Sea (890) and the Gulf of Finland (801).

2. Diving conditions.—The ballast increments required during the dive from periscope depth to 200 feet, in the inshore waters of the Gulf of Finland (801), will vary from 4,000 pounds pumped, May, November and December, to more than 20,000 pounds flooded, July and August. Figure III-39 illustrates the ballast changes necessary to obtain good trim at 200 feet, following the dive from periscope depth. These ballast predictions were computed from the submarine bathythermograph card for a submarine of 2,400 tons submerged displacement; the isoballast line separation was 2,000 pounds, the diving rule 1,400 pounds per 100 feet. Thus, vertical salinity gradients were not considered. Moving into the more open waters of the gulf, the variation in ballast increments during the dive from periscope depth to 200 feet is from 4,000 pounds pumped to 6,000 pounds flooded. These waters, less protected from wind action, undergo more complete vertical mixing and consequently the depth of the isothermal layer is greater and the decrease in temperature per unit of depth is less.

The ballast requirements in the eastern Baltic (890) during dives from periscope depth to 400 feet and from 200 to 400 feet are also shown in Figure III-39. The temperature inversions previously mentioned are indicated by the fact that the ballast increments for the descent from 200 to 400 feet May through July are negative (— 4,000 pounds).

Figure III-40 is a diagrammatical representation of the vertical distribution of temperature along a line from Liepāja (878) westward across the Baltic (890). The vertical temperature distribution, as illustrated by this figure, is typical for the Baltic (890) during the summer months. The isotherms are plotted against depth with the vertical scale greatly exaggerated. The best depth for evasion (E) and the best depth for balancing (B) are indicated by the small submarines.

(c) South Coastal Sector

1. Sonar conditions.—During the summer months, the periscope depth and assured ranges will be short in the area within the 100 fathom curve north of a line from

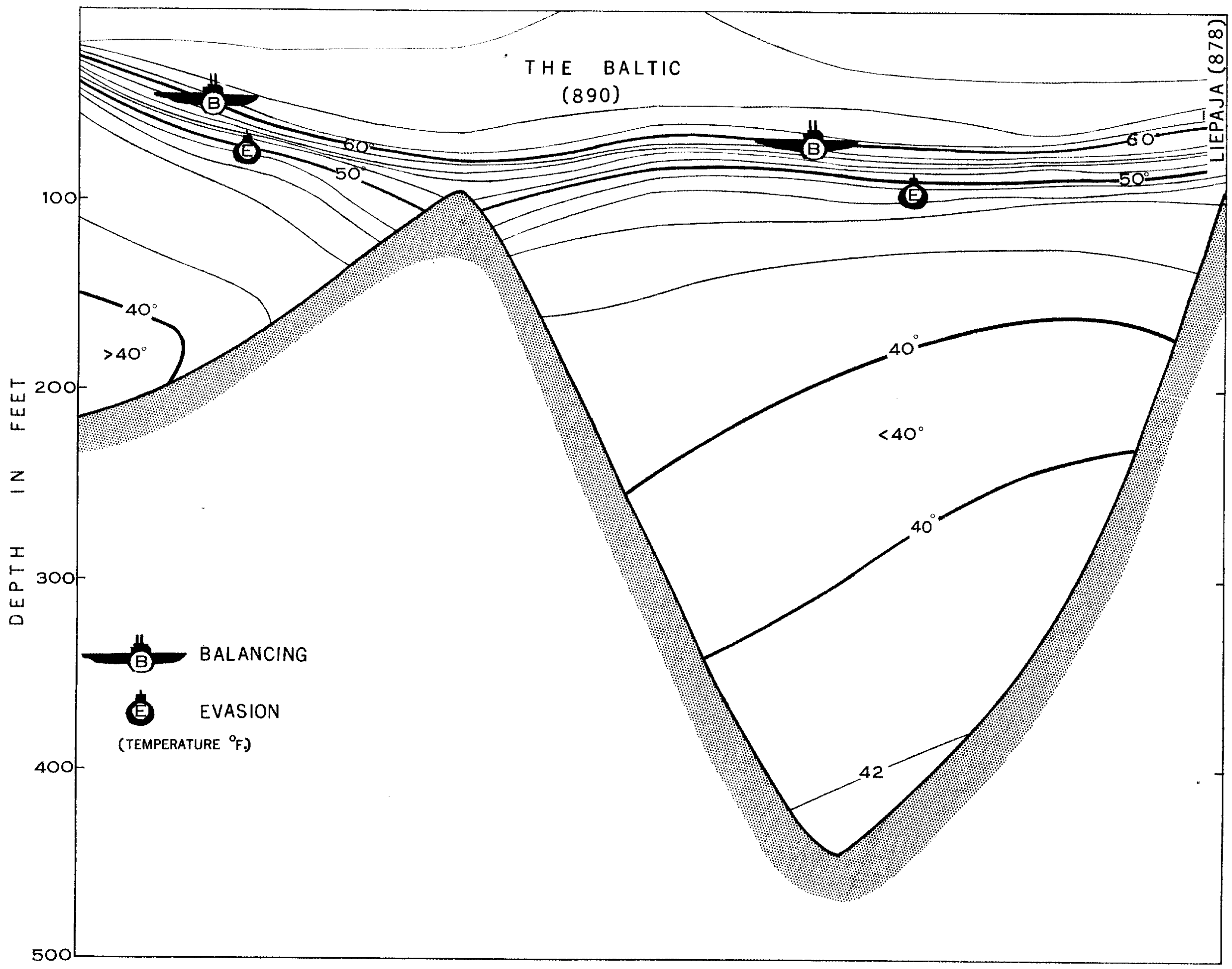


Figure III - 40. *West Coastal Sector, diagrammatic vertical temperature section from Liepāja westward across the Baltic, midsummer.*

Sevastopol' (931) west to the mouth of the Danube (902). Well-developed vertical temperature gradients are prevalent from late May until early October. FIGURE III-41A illustrates the mean vertical temperature curve for the summer months. The periscope-depth range will average 1,500 yards, while the layer depth will average 40 feet with a mean assured range of 1,000 yards. This assured range will increase about 200 yards with each 100 foot increase in depth. During the summer months, diurnal heating will effectively reduce the sonar ranges during the afternoon and evenings.

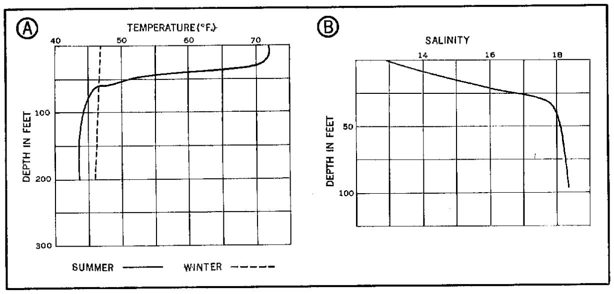


FIGURE III - 41. *South Coastal Sector.*
A. Mean vertical temperature conditions for area within the 100-fathom curve.
B. Vertical salinity distribution off the Danube estuary.

FIGURE III-42 illustrates the seasonal cycle of the vertical temperature distribution for the area outside the 100-fathom curve. The seasonal distribution of the surface temperature is given in FIGURES III-12 to III-23. In the offshore areas the periscope-depth range will average 2,000 yards, the layer depth 60 feet, and the mean assured range about 1,500 yards. This assured range will increase about 300 yards with each 100 foot increase in depth. Diurnal heating will reduce the periscope-depth range 15 to 20% of the time.

With the downward refraction of the sound beam, resulting from the negative temperature gradients, the type of bottom, mud, sand, or rock, will have an influence on the range predictions in areas having less than 100-fathom depths. Reference to FIGURE III-50 will indicate the types of bottom sediments to be found in this area. If the sediments are *mud,* the sonar ranges will be comparable, with similar temperature conditions, to those predicted for deep water. If the bottom sediments are *rock, stone,* or firm *sand,* reverberations will tend to mask the echo and decrease the effective ranges.

The discharge of fresh water from the Dnepr (917) and the Danube (902) is greatest during the late spring and the early summer, following the melting of snows. This dilution of the coastal waters will decrease the density and will be an important factor in determining the sonar ranges for the coastal areas from Tendrovskiy Zaliv (921) west to Odessa (905) and then south past the Danube (902). FIGURE III-29 illustrates the mean annual surface salinity distribution for the Black Sea (901). The low salinity values for the above delineated coastal areas results from the discharge of the Dnepr (917) flowing westward along the coast to Odessa (905) and thence southward along the western shore to the delta of the Danube (902), receiving on its way the outflow of the other rivers along the coast. This layer of surface water with low salinity, 12 to 15 parts per thousand, overlying the deeper, more saline basin waters, 18 to 22 parts per thousand (FIGURE III-41B), will result in strong downward refraction of the sound beam and consequently appreciably shortened ranges.

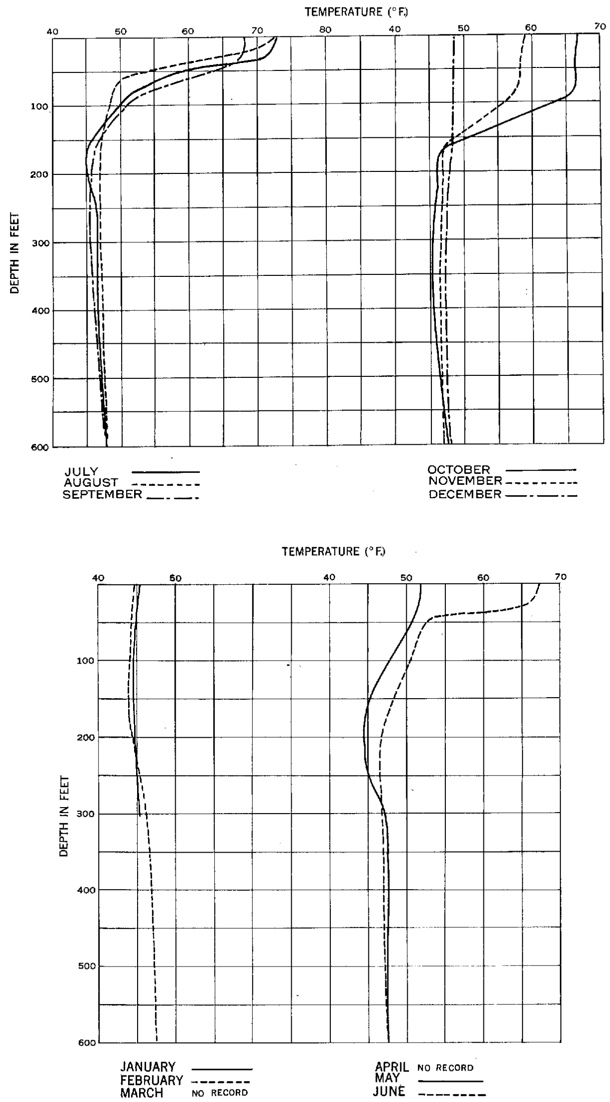


FIGURE III - 42. *South Coastal Sector, annual vertical temperature cycle.*

During the months of December and January in areas with depths of 100 fathoms or less, the temperature distribution is fairly uniform from the surface to the bottom (FIGURE III-41A). With wind forces of 5 or less, the sonar ranges will be primarily dependent upon the type of bottom sediments. Over *mud* and *sand and mud,* the ranges at all depths will be in excess of 2,000 yards. Over *rock, stone,* and firm *sand,* these ranges will usually be decreased by reverberations. During February, March, and possibly early April, there will be slight temperature inversions, the temperature increasing with depth to about 600 feet. Below this depth, temperature is uniform at approximately 46° F. If shallow inversions are present, the sonar beam will be refracted upward, usually decreasing the range to 1,000 yards or less. The possibility of sound channels, a layer of water bounded on the upper and lower surfaces by water of higher sound velocity, exists when these inversions are present. These sound channels result in very long sonar ranges, since the sonar beam is reflected back into the channel at either the upper or lower surface.

In the open sea, with depth in excess of 100 fathoms, the ranges should be greater than 2,000 yards during the winter months. Slight temperature inversions, 1.0 to 2.5° F. have been reported, but are usually at depths greater than 500 feet.

A submarine operating below layer depth in the presence of well-developed temperature gradients as shown for July, August, and September (FIGURE III-40) will usually be able to approach attacking vessels to within 1,500 yards or less without danger of detection by echo ranging. FIGURE III-37 illustrates the variation in range with depth for the mean temperature trace for these three months. As the temperature stratification decreases, approaching isothermal conditions, the danger of detection by echo ranging will increase. FIGURE III-43 shows the variation in range with depth for the mean vertical temperature distribution in January, February, and March.

The low water temperatures in the shallow areas of the Black Sea (901) during the winter months prevents the existence of snapping shrimp. However, other biological noises undoubtedly are present. Fish, feeding on the abundant molluscan and crustacean fauna in the shallow waters, will produce a high background noise level, and in the offshore waters, schools of mackerel and shad, and the three species of Black Sea porpoise and one species of seal may make noises which occasionally will be confusing to sonar operators. The porpoise make sounds like pinging, while the seal produces a barking sound, both raising the background noise level.

2. DIVING CONDITIONS.—The ballast increments required to trim the boat when diving from periscope depth to 200 feet, 200 feet to 400 feet and from periscope depth to 400 feet are shown in FIGURE III-44. It can be seen that during the summer months, May through September, it will be necessary to flood ballast to obtain trim at depth. During July and August, positive ballast increments in excess of 15,000 pounds may be necessary. These estimates were obtained from the submarine bathythermograph card and do not consider salinity gradients. If operations are conducted in the areas off the northwestern and western coasts of the Black Sea (901), the extreme salinity gradients (FIGURE III-41B) must be taken into account. Positive ballast increments in excess of 20,000 pounds may be necessary.

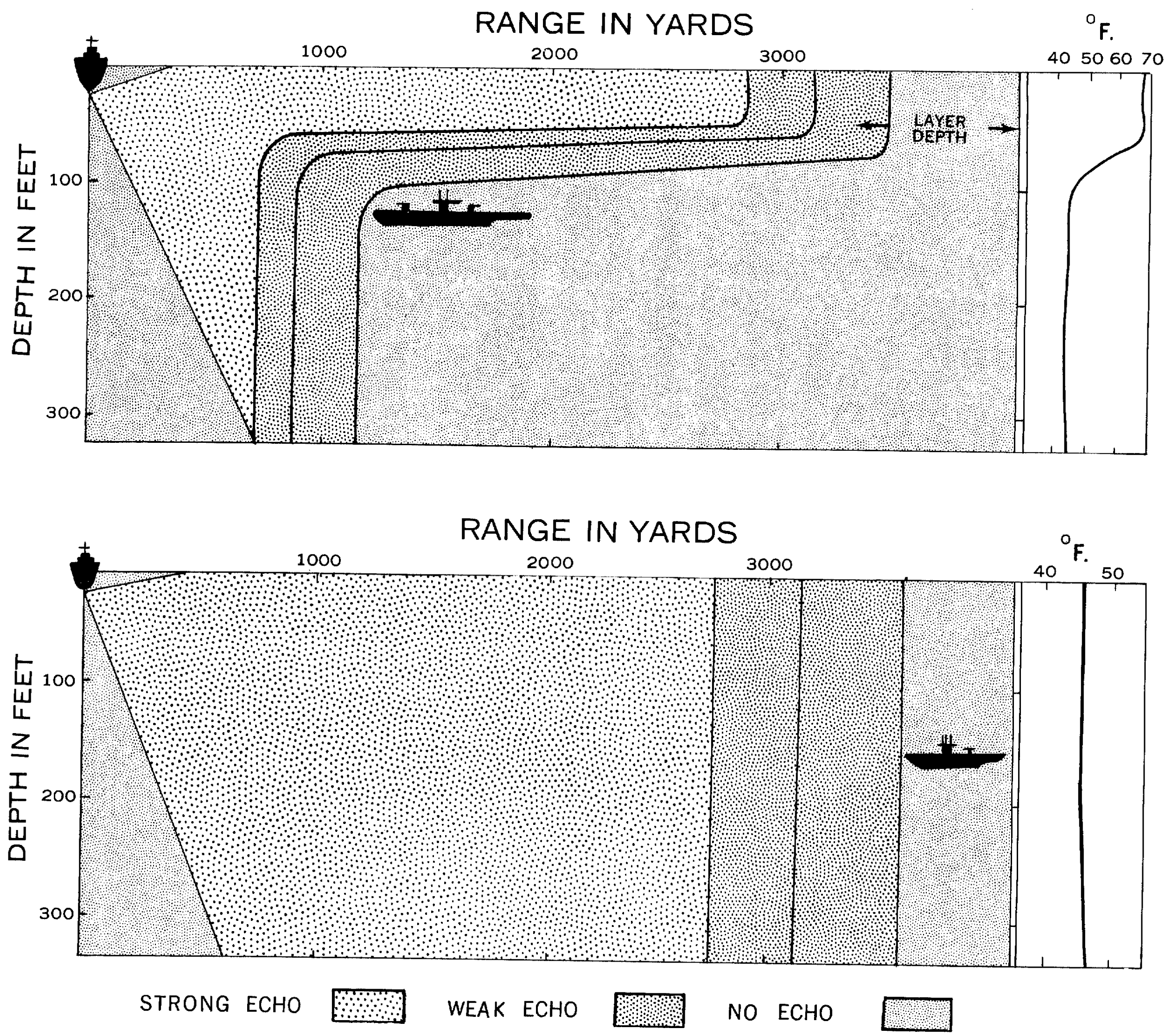


FIGURE III - 43. *South Coastal Sector, diagrammatic representation of predicted range at depth for negative thermal gradient and for nearly isothermal conditions.*

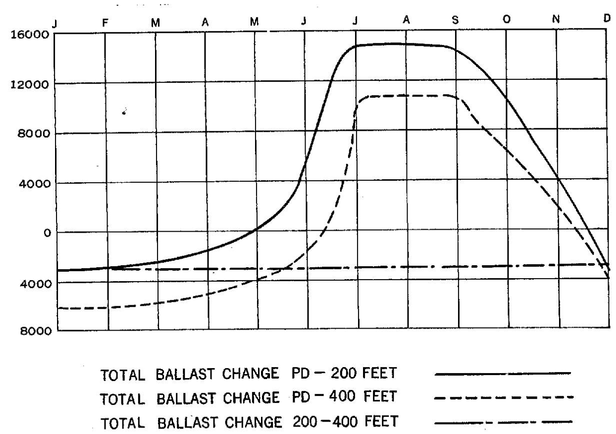


FIGURE III - 44. *South Coastal Sector, ballast predictions for waters of depths greater than 100 fathoms.*

FIGURE III-45 illustrates the mean seasonal density changes for the open sea (outside the 100-fathom curve) between the surface and 400 feet. Comparing this figure with FIGURE III-42 it will be observed that although there are temperature inversions, or an increase in temperature with depth, the density increases with depth during all seasons. Warm water can lie under cooler water only if it is denser. Thus, a positive temperature gradient will always be accompanied by a salinity gradient large enough to make the deeper water at least as dense as the upper water, and perhaps much denser. The salinity gradient will extend throughout the positive temperature gradient, and probably into the thermocline (layer of negative gradient) below it, but normally will not be present in layers of isothermal waters. If it is necessary to flood under such temperature — salinity conditions, it will be possible to balance.

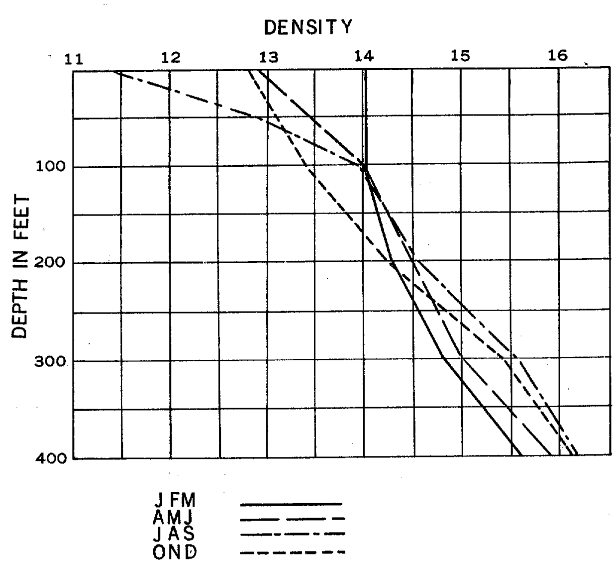


FIGURE III - 45. *South Coastal Sector, mean density curves.*

The ballast changes, during the late fall, winter, and early spring months, will usually be negative. However, during the spring and fall months, the transitional period from winter to summer temperature conditions, isoballast conditions or no change of ballast with depth, may be encountered. Large salinity gradients, as shown in FIGURE III-41B, may exist following the discharge of the fresh water from the Danube (902) and the Dnepr (917). This will result in an increase in density with increase in depth, and will necessitate flooding to obtain trim at depth. As previously mentioned, positive ballast increments of as much as 20,000 pounds may be required.

It should be possible for a submarine to balance at some depth between periscope depth and 300 feet during the period of June through October. The mean vertical temperature traces for these months (FIGURE III-42) indicate that balancing and running at "creeping" speeds should be easily accomplished. The ease with which a submarine can maintain its position within a density layer depends upon the sharpness and thickness of the layer. The sharpness is the increase in buoyancy over a definite depth interval; that is, the buoyancy change divided by the depth change. It may be assumed that conditions are favorable for balancing and running in balance if the bathythermograph shows a 3,000 pound layer; that is, if the temperature trace crosses at least one and one-half isoballast intervals.

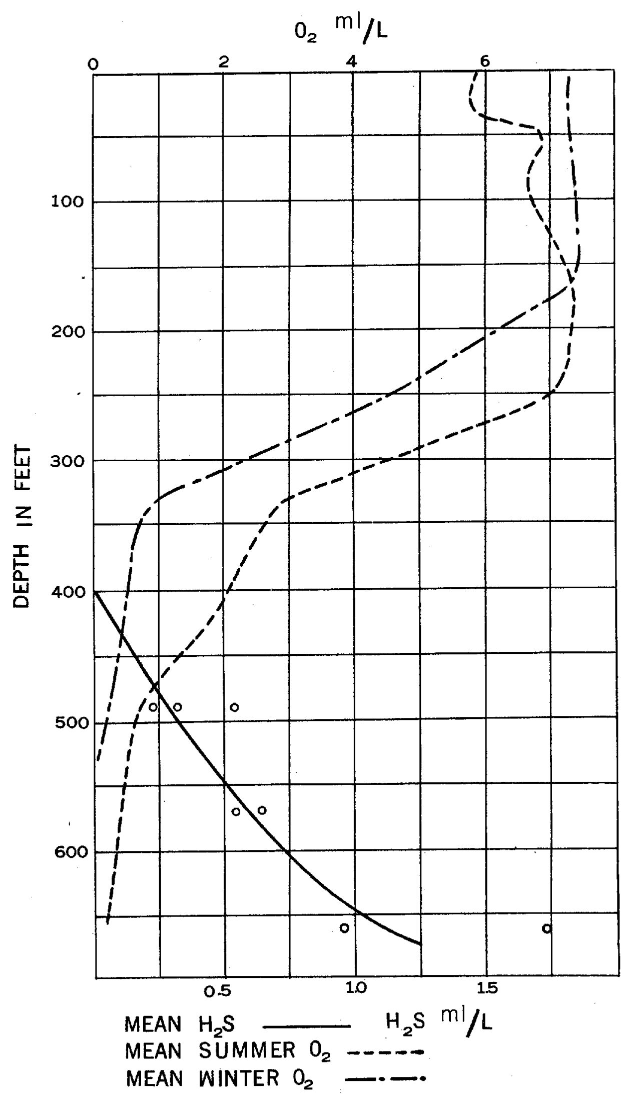


FIGURE III - 46. *South Coastal Sector, vertical distribution of H_2S and O_2.*

Hydrogen sulfide, H_2S, is present in solution in the water of the Black Sea (901) at depths in excess of approximately 400 feet. A curve of the mean H_2S content, expressed in milliliters per liter, is shown in FIGURE III-46. Also included on this figure are the mean curves for the vertical oxygen distribution during the winter and the summer. It is to be noted that the oxygen content approaches zero between 500 and 600 feet and that hydrogen sulfide increases as oxygen decreases. Hydrogen sulfide is a highly toxic gas, comparable to phosgene in its lethal properties. Assuming equilibrium conditions, air in contact with water containing 0.75 milliliters H_2S per liter would produce fatal effects after breathing for about 45 minutes. The gas could enter the submarine through the leaky glands around the shafts, and whenever the high pressure air from the ballast tanks is vented inboard.

The evolution of H_2S dissolved in water can be minimized by making the water alkaline, using lye, soda, borax, trisodium phosphate, laundry soap, or other alkali.

E. Electrical conductivity

(1) General

The conductivity of sea water as a function of temperature and salinity is given in FIGURE III-47.

(2) Specific areas

(a) North Coastal Sector.—Conductivity of the surface waters will range from about 0.002 reciprocal ohms per cubic centimeter near river mouths at the spring freshet to about 0.035 in the open Barents Sea (1) in the summer.

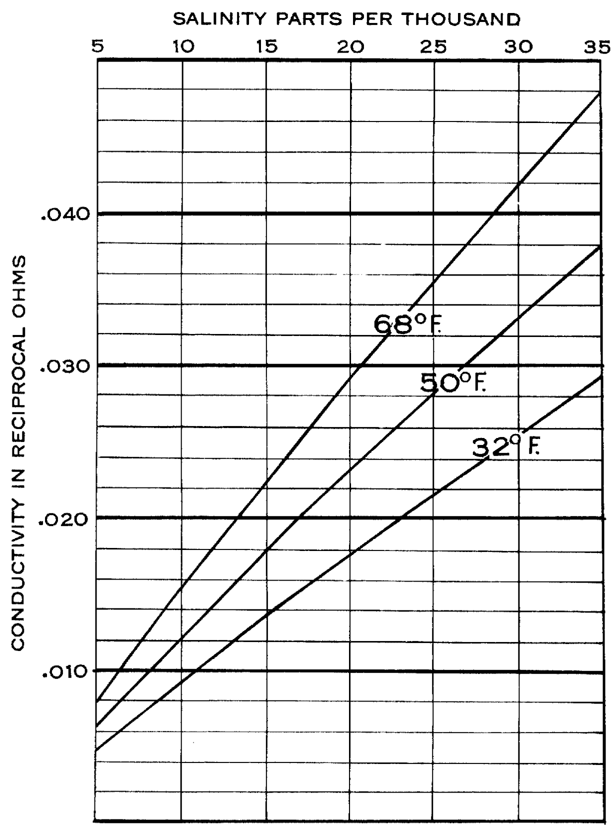


FIGURE III-47. *Electrical conductivity of sea water in reciprocal ohms per centimeter cube as a function of salinity and temperature.*

(b) West Coastal Sector.—Conductivity of the surface waters will range from about 0.002 reciprocal ohms per cubic centimeter near river mouths in the spring to about 0.015 in the summer offshore.

(c) South Coastal Sector.—Conductivity of the surface waters will range from about 0.002 reciprocal ohms per cubic centimeter near river mouths in the spring to about 0.025 offshore in the summer.

34. BOTTOM SEDIMENTS

A. Characteristics of sediment types

Knowledge of the characteristics and distribution of bottom sediments in water depths of less than 100 fathoms is important in mine warfare, in planning landing operations, and particularly in predicting underwater sound conditions. The characteristics of various types of bottom sediments as they affect sonar operation are given in TABLE III-4.

B. Horizontal distribution

(1) North Coastal Sector

The Barents Sea (1) and Karskoye More (18) are relatively shallow. The 100-fathom curve comes within 60 miles of the coast only at the southeastern corner of Novaya Zemlya (2), where there is a basin 15 miles off the coast; east of Ostrov Vaygach (27), where a basin is within 13 miles of the shore; and along the coast west of longitude 39°30′ E, where there are depths of 100 fathoms within 1 to 15 miles of shore. The Beloye More (White Sea) (109) has depths generally less than 50 fathoms except for a basin with a maximum depth of about 190 fathoms and a length of 100 miles in Kandalakshskaya Guba (189).

Bottom sediments between Ostrov Vaygach (27) and Poluostrov Yamal (19) are patchy and chiefly of *mud, sand and mud,* or *clay* with some *rock* offshore; nearshore, there are probably the same sediments plus *sand* and patches of *rock*. Little is known of the sediments along the east coast of Novaya Zemlya (2), but probably there is *rock,* particularly off the numerous headlands and around the small islands, with *mud* between the rocky areas. The west coast is similar with the exception of a belt of *mud* some distance offshore and of patches of *stone* as well as of *rock* and *mud*. The straits on each end of Ostrov Vaygach (27) are *rock;* off the west coasts of this island and the mainland just to the south, there is *mud* which grades into a belt of *sand* or *sand and mud* with occasional patches of *stone*. This belt extends westward along the coast past Ostrov Kolguyev (46) and Poluostrov Kanin (54) as far west as longitude 40° E. West of this point, the sediments are of *rock* or *sand,* with some *stone* near shore, and are predominately patchy in nature, with *mud* in the deeper portions of the inlets; offshore, *sand and mud* grades into the *mud, stone,* or *sand* which make up the floor of the Barents Sea (1).

The floor of the Gorlo (257) is largely *stone* or *rock* with some *sand,* while the major portion of the Beloye More (White Sea) (109) is chiefly *mud* with some *rock* near shore. There is *sand* or *sand and mud* off the mouths of the Severnaya Dvina (105) and *sand* or *sand and mud* with patches of *rock* or *stone* in Onezhskaya Guba (132). The nearshore areas of this latter gulf are likely to be particularly *rocky*.

(2) West Coastal Sector

There are only three very restricted areas with depths greater than 100 fathoms. The northernmost is about 70 miles west of Hiiumaa (845), the central area the same distance west of southern Saaremaa (856), and the southernmost 40 miles west of Ventspils (876). Depths in the Gulf of Finland (801) are for the most part less than 50 fathoms, with similar depths in the eastern Baltic Sea (890) south of Hiiumaa (845) within 25 miles of shore.

The uppermost layers of the bottom sediments, although occupying a preglacial depression, are largely late-glacial or postglacial. While sediments in the eastern part of the Gulf of Finland (801) are extremely variable with patches of *mud, rock, sand,* or *stone,* outside Leningrad (811) there is only *sand.* Dotted with numerous *rocky* islands, the north coast of this gulf has a *rock* bottom. The central part is floored with *sand and mud* or *sand,* which becomes muddier toward the mouth where the sediments grade into the *muds* of the deeper, central part of the Baltic Sea (890). Sediments along the south coast of the Gulf of Finland (801) are variable and include *sand, sand and mud, mud, rock,* and *stone.* The same sediments are found with a patchy distribution in the neighborhood of Hiiumaa (845) and Saaremaa (856) and near shore in

TABLE III - 4

CHARACTERISTICS OF TYPES OF BOTTOM SEDIMENTS

Type of bottom	Description of bottom	Probable acoustic effects of bottom
Sand (including shells and washed gravel).	Firm, relatively smooth bottom.	Maximum echo ranges usually exceed 2,000 yards regardless of temperature conditions. Over *sand and shells* the noise level may be high.*
Sand and mud (including firm clay).	Relatively firm, smooth bottom.	Echo ranges are variable; skip distances are likely. Reverberations may be high.
Mud	Soft, smooth bottom.	Echo ranges are rarely longer and frequently shorter than those for deep water under the same temperature conditions. Reverberation may be high. Scattering from particulate matter, following high seas, may raise background noise level.
Stone (predominately cobbles and pebbles with varying amounts of mud and sand).	Hard bottom, commonly rough.	Maximum echo ranges are frequently less than 7 times the depth, because of high reverberation. Noise level may be high in depths less than 30 fathoms.*
Rock (including bedrock outcrops and areas covered by boulders).	Rough, broken bottom.	Because of high reverberation, maximum echo ranges are usually less than 7 times the depth, but when the water is isothermal to the bottom they may exceed 2,000 yards. Noise level may be high in depth less than 30 fathoms.*

* The noise is caused by certain bottom-living animals and is characterized by a crackling sound with high frequency components.

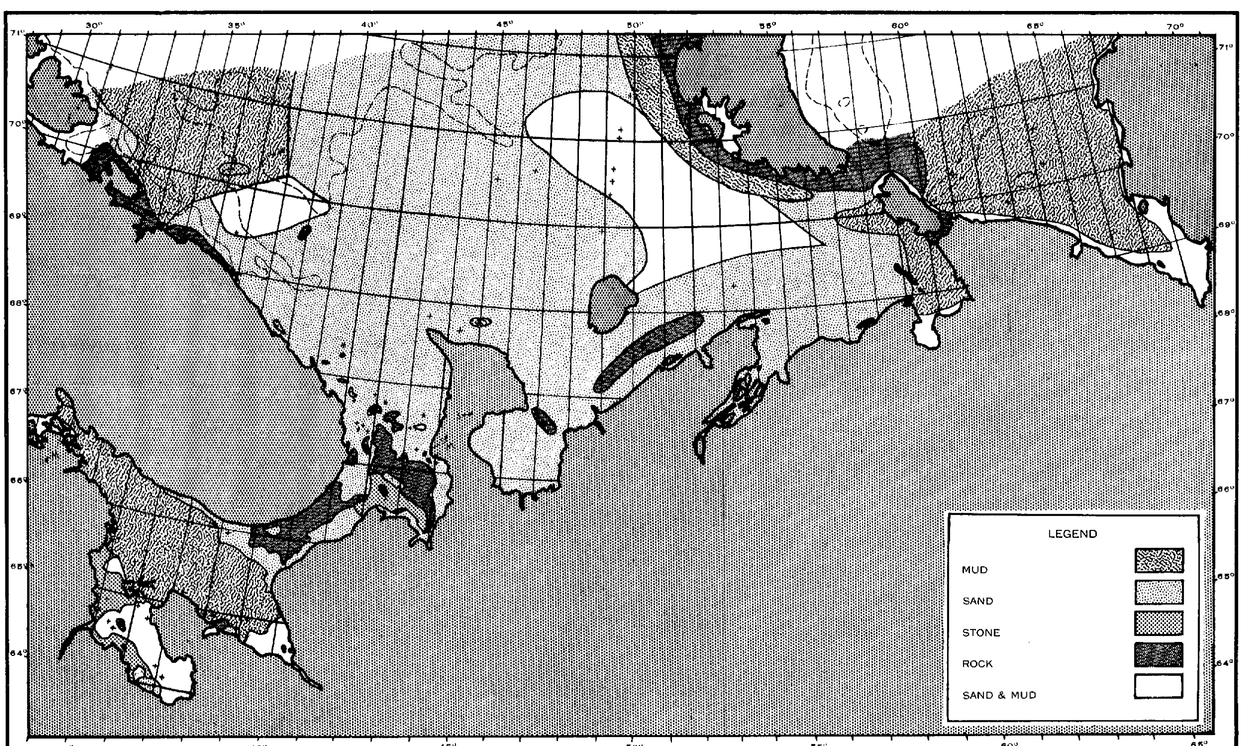


FIGURE III - 48. *North Coastal Sector, bottom sediments.*

the Gulf of Riga (866). The frequent shoals of this area are of *rock, stone,* or *sand.* The central part of the Gulf of Riga (866) is likewise patchy and of *sand, sand* and *mud, mud,* or *stone.* Below Ovisi (875) the sediments are chiefly *sand* or *stone* near shore with some patches of *rock* and *clay,* while in the deeper part offshore they are largely *mud, sand and mud,* or *sand.* The Kurisches Haff (882) and the Frisches Haff (888) are floored with *sand, sand and mud,* and *sandy clay.*

(3) South Coastal Sector

The 100-fathom curve penetrates north of the line Sulina (902) — Sevastopol' (931) only as a flat trough about 30 miles south of Mys Tarkhankut (927). Eastward from Sevastopol' (931), the 100-fathom curve lies 7 to 15 miles off the coast until near longitude 34°30′ E where it turns eastward along latitude 44°45′ N and passes 25 to 30 miles off the entrance to Kerchenskiy Proliv (938).

North of the line Sulina (902) — Mys Tarkhankut (927), the sediments in the central, deeper portion of the Black Sea (901) and its estuaries are chiefly *sand and mud* or *mud.* Near shore, *sand* predominates. There are a few patches of *rock* or *stone* along the north coast. South and east of Mys Tarkhankut (927) as far as Feodosiyskiy Zaliv (936), *mud* predominates both in inshore and offshore areas, although there are occasional strips of *sand* along

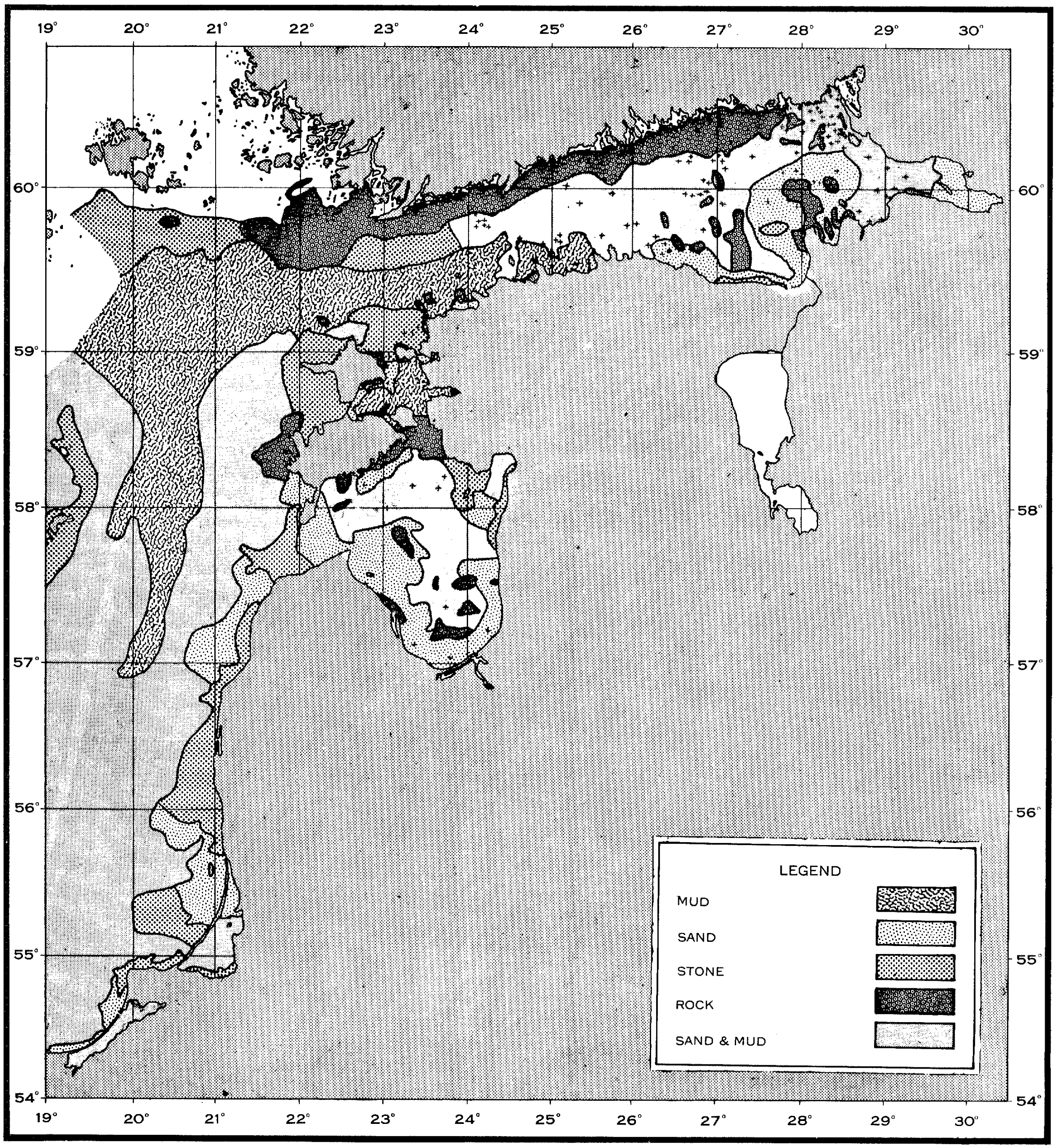


FIGURE III - 49. *West Coastal Sector, bottom sediments.*

the coast. Patches of *rock* or *stone* are rather frequent, particularly off headlands. From Feodosiyskiy Zaliv (936) to Kerchenskiy Proliv (938), the offshore area continues *muddy,* but the *mud* of the near shore area becomes *sandier* in texture and there is probably *sand* in the open bights. In the Kerchenskiy Proliv (938), there is *sand* or *sand and mud,* with *rock* lying off the small headlands. The bottom of Azovskoye More (945) is largely *mud,* although there are large areas of *sand* or *sand and mud* off the northeast, east, and west coasts.

FIGURES III-48 to III-50 are bottom sediment charts for the three coastal sectors of European U.S.S.R. Detailed information on the bottom sediments is listed in TABLE III-14.

35. BIOLOGICAL FACTORS

A. Bioluminescence

Night detection or concealment of PT boats and other small craft leaving a large wake is seriously affected by the luminescence ("phosphorescence") produced by *Noctiluca miliaris* and similar organisms when disturbed. On moonless nights concentrations of these organisms may produce enough light to confuse navigators and interfere with dark adaptation.

There are few records of these organisms from the north coastal sector, and they probably are limited to the warmer waters in that area. There are no records of them from the Baltic Sea (890), although they probably occur there to some extent. They are very abundant in the Black Sea (901), however, where fishermen make use of their light for detecting schools of fish.

B. Algae

No large kelps are known in any of the coastal sectors of European U.S.S.R. Smaller forms, and the eelgrass *Zostera,* which is particularly abundant in the Black Sea (901), will tend to make submerged rocks slippery along rocky shores.

C. Miscellaneous

Great quantities of driftwood have been reported in the entrance to the Beloye More (White Sea) (109). This driftwood, partly large tree trunks, has been washed down the rivers in the spring freshet.

Noise-producing organisms are discussed in Topic 33, D.

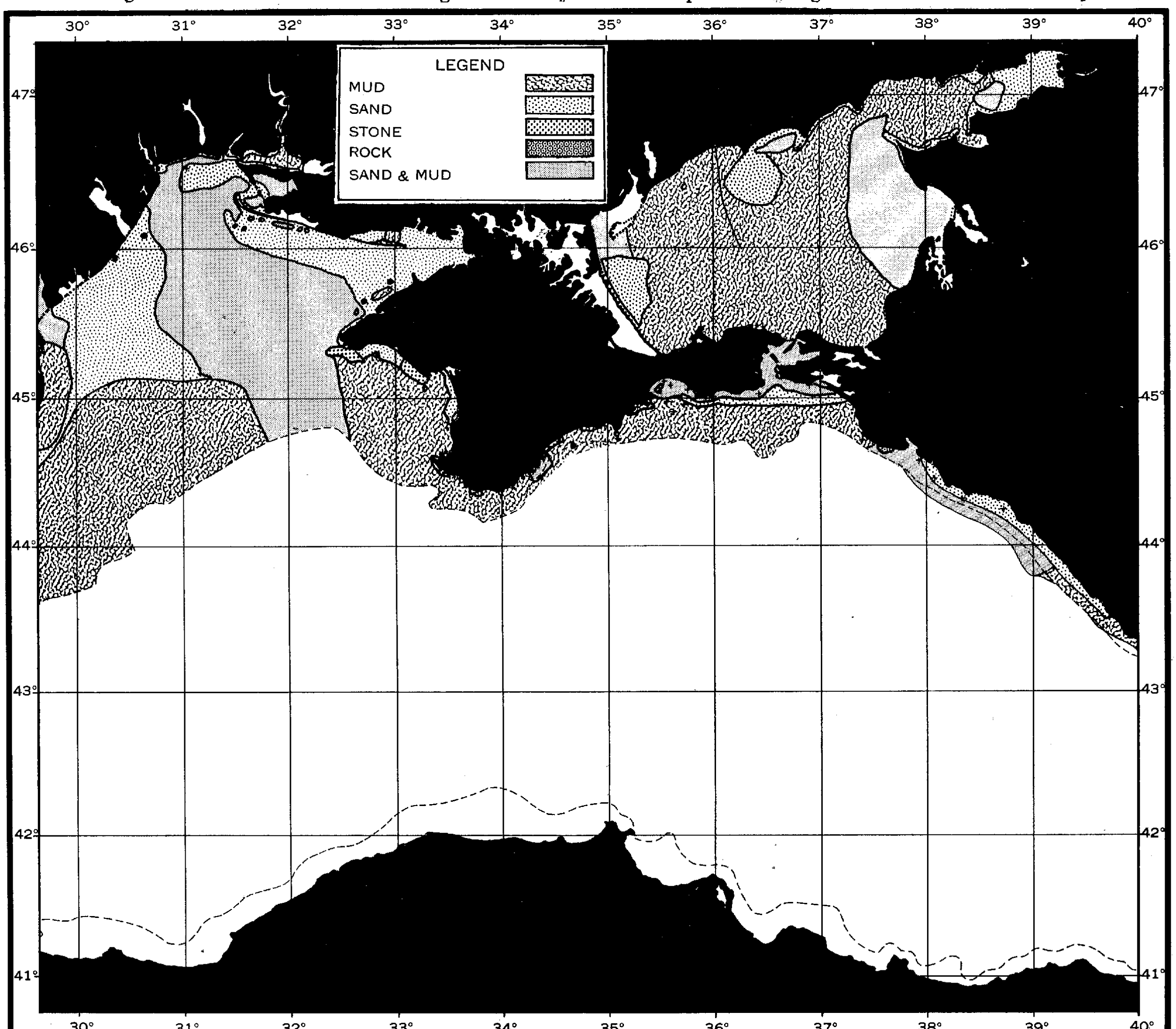


FIGURE III - 50. *South Coastal Sector, bottom sediments.*

36. REFERENCE TABLES

TABLE III - 5

TIDAL DIFFERENCES AND CONSTANTS
(Daily predictions of times and heights of tides for the reference stations can be obtained from recent volumes of tide tables*)

PLACE AND REF. NO. (Figs. III - 51, III - 52, and III - 53)	LOCATION		TIDAL DIFFERENCES		TIDAL RANGES		
			Times	Heights			
	Lat. (N)	Long. (E)	Time of HW & LW	Ratio for HW & LW	Spring	Mean	MSL
	° ′	° ′	hr. min.		ft.	ft.	ft.
			Time Meridian 60° E				
Coast of Karskoye More (18)			Reference Station: Khabarovo (25)				
Karskaia Guba (21)	69 15	64 57	+0 50	1.02	1.9	1.4	1.2
			Reference station: Guba Kamenka (4)				
Ostrov Mestnyy (22)	69 49	61 12	+0 15	1.00	2.0	1.5	1.5
			Reference station: Khabarovo (25)				
Proliv Yugorskiy Shar (23)							
NE entrance (24)	69 49	60 45	−1 15	1.02	1.9	1.4	1.2
KHABAROVO (25)	69 39	60 25	(see predictions) *		1.9	1.4	1.2
Ostrov Vaygach (27)							
Proliv Yugorskiy Shar (23)							
Guba Varneka (34)	69 42	60 03	+1 10	1.16	2.2	1.6	1.4
Mys Bol'shoy Lyamchin Nos (33)	69 51	59 11	+0 15	0.86	1.6	1.2	1.0
Proliv Karskiye Vorota (6)							
Guba Dolgaya (32)	70 15	59 29	−1 10	0.86	1.6	1.2	1.0
Ostrov Voronov (30)	70 21	58 32	−1 40	0.84	1.6	1.2	1.0
			Reference station: Guba Kamenka (4)				
Mys Bolvanskiy Nos (29)	70 28	59 05	−0 05	1.07	2.1	1.6	1.6
Novaya Zemlya (2)							
Proliv Karskiye Vorota (6)							
Ostrov Kusova Zemlya (8)	70 29	57 02	+0 35	0.87	1.7	1.3	1.3
Ostrov Bol'shoy Loginov (7)	70 30	57 24	+0 30	1.00	2.0	1.5	1.5
GUBA KAMENKA (4)	70 36	57 25	(see predictions) *		2.0	1.5	1.5
			Reference station: Yekaterininskaya Gavan' (335)				
Malyye Karmakuly, Zaliv Mollera (17)	72 23	52 45	+3 35	0.20	2.0	1.6	1.4
Guba Belush'ya (16)	71 32	52 19	+3 40	0.13	1.3	1.0	0.9
Ozero Nekhvatovo Pervoye (15)	71 18	53 40	+3 45	0.07	0.7	0.6	0.5
Guba Sakhanikha, Guba Rakhmanova (10)	70 38	55 38	+9 25	0.11	1.1	0.9	0.8
Petukhovskiy Shar (9)	70 34	56 24	+9 40	0.19	1.9	1.5	1.3
Coast of Barents Sea (1)							
Ostrov Dolgiy (36)	69 12	59 10	−1 30	0.27	2.7	2.1	1.9
Ostrov Varandey (37)	68 49	58 00	−1 30	0.27	2.7	2.1	1.9
Pechora (43), bar	68 24	54 26	0 00	0.27	2.7	2.1	1.9
Mys Bolvanskiy Nos (41)	68 17	54 27	+0 10	0.27	2.7	2.1	1.9
Ostrov Zelenyy (42)	68 16	54 18	+1 00	0.22	2.2	1.7	1.5
Gulyayevskiye Koshki (44), E cst.	68 58	54 40	−2 30	0.27	2.7	2.1	1.9
Mys Russkiy Zavorot (45)	68 59	54 20	−3 15	0.27	2.7	3.1	1.9
			Time Meridian 45° E				
Indiga (48), entrance	67 42	48 46	−2 40	0.68	6.7	5.4	4.8
Bugrino (47)	68 48	49 21	+6 05 H +7 30 L	0.41	4.1	3.2	2.9
Kambal'nitsa (53), entrance	69 19	45 58	+6 40	0.81	8.0	6.4	5.7
Beloye More (109)							
Mys Kanin Nos (55)	68 40	43 15	+4 05	0.84	8.3	6.6	5.9
Tarkhanovo (56)	68 30	43 39	+4 55	0.95	9.4	7.5	6.6
Kiya (59), mouth	67 40	44 06	+4 55 H +5 50 L	1.18	11.7	9.3	8.3
Banka Litke (63)	67 11	42 48	+5 10	1.63	16.1	12.9	11.4
			Reference station: Ostrov Sosnovets (259)				
Mys Konushin (61)	67 11	43 47	+2 20	1.54	18.5	15.4	12.3
Ostrov Morzhovets (82)	66 45	42 25	+1 20	1.36	16.3	13.6	10.9

H — Time difference for high water only.
L — Time difference for low water only.
* U.S.S.R. Tide Tables, and Tide Tables, Atlantic Ocean, of the U.S. Coast and Geodetic Survey.

TABLE III - 5 (Continued)

PLACE AND REF. NO. (Figs. III - 51, III - 52, and III - 53)	LOCATION		TIDAL DIFFERENCES		TIDAL RANGES		
			Times	Heights			
	Lat. (N)	Long. (E)	Time of HW & LW	Ratio for HW & LW	Spring	Mean	MSL
	° ′	° ′	hr. min.		ft.	ft.	ft.
			Time Meridian 45°				
Beloye More (109) (Continued)			Reference station: Yekaterininskaya Gavan' (335)				
Mezenskaya Guba (65)							
Semzha (69), mouth	66 09	44 07	+7 10 H +8 15 L	2.85	28.2	22.5	20.0
Pyya (70), mouth	66 02	44 09	+7 20 H +9 10 L	1.98	19.6	15.6	13.9
Kamenka (71)	65 53	44 08	+7 50 H +11 05 L	1.13	11.2	8.9	7.9
Kuloy (75)	66 12	43 45	+7 10	2.17	21.5	17.1	15.2
Mys Nerninskiy (77)	66 14	43 40	+6 40 H +7 35 L	2.74	27.1	21.6	19.2
Mys Abramov (79)	66 25	43 16	+6 50	2.42	24.0	19.1	16.9
Yurovatyy (81)	66 27	42 34	+6 10	2.08	20.6	16.4	14.6
Mys Voronov (83)	66 31	42 17	+4 50	1.85	18.3	14.6	13.0
			Reference station: Kem' (176)				
Bol'shaya Kedovka (84), entrance	66 30	42 08	+7 35	2.34	11.2	9.6	8.4
Mayda (85), entrance	66 20	41 56	+7 40 H +8 40 L	2.00	9.6	8.2	7.2
Megra (86), entrance	66 09	41 37	+7 10	1.38	6.6	5.7	5.0
Ruch'i (87), entrance	66 03	41 16	+7 35	1.34	6.4	5.5	4.8
Mys Intsy (88)	65 59	40 47	+7 10 H +6 10 L	1.22	5.9	5.0	4.4
Tova (90), entrance	65 47	40 26	+6 00	0.74	3.6	3.0	2.7
Zolotitsa (91), entrance	65 41	40 14	+6 35 H +4 40 L	0.25	1.2	1.0	0.9
Mys Lysunov (93)	65 34	39 47	+2 20	0.27	1.3	1.1	1.0
Mys Kerets (95)	65 20	39 45	+0 25	1.12	5.4	4.6	4.0
Dvinskaya Guba (108)							
Kuya (98), entrance	65 05	40 06	+1 10	0.83	4.0	3.4	3.0
			Time Meridian 30° E				
Berezovyy (99), bar	64 54	40 11	+0 40	0.74	3.6	3.0	2.7
Ostrov Mud'yugskiy (100)	64 51	40 17	+0 30 H −0 50 L	0.70	3.4	2.9	2.5
Severnaya Dvina (105)							
Ostrov Lapominka (101)	64 46	40 30	+1 05 H −0 05 L	0.74	3.6	3.0	2.7
Novodvinskaya Krepost' (102)	64 42	40 25	+1 30	0.64	3.1	2.6	2.3
Arkhangel'sk (104)	64 34	40 30	+1 55	0.52	2.5	2.1	1.9
Nikol'skoye Ust'ye (106), bar	64 35	39 47	+0 20	0.64	3.1	2.6	2.3
Unskaya Guba (113)	64 47	38 27	−0 05 H −1 15 L	0.62	3.0	2.5	2.2
Lopshenga (114), entrance	64 57	37 42	−1 40	0.67	3.2	2.7	2.4
Ostrov Zhizhginskiy (115)	65 12	36 49	−0 40	0.77	3.7	3.2	2.8
Ostrov Anzerskiy (117)	65 08	36 12	−0 15	0.74	3.6	3.0	2.7
Sosnovaya Tonya (121)	65 08	35 38	0 00	1.00	4.8	4.1	3.6
Zaliv Solovetskiy (123)	65 01	35 42	+0 25	0.54	2.6	2.2	1.9
Ostrov Bol'shaya Muksalma (127)	65 01	36 00	+0 50	0.54	2.6	2.2	1.9
Onezhskaya Guba (132)							
Mys Letniy Orlov (131)	64 55	36 27	+0 30	0.74	3.6	3.0	2.7
Guba Pushlakhta (133)	64 49	36 32	+2 55	0.64	3.1	2.6	2.3
Mys Chesmenskiy (135)	64 43	36 32	+3 30 H +2 45 L	0.63	3.0	2.6	2.3
Mys Glubokiy (139)	64 21	37 20	+4 05	1.30	6.2	5.3	4.7
Ostrov Kiy (141)	63 59	37 54	+3 50	1.96	9.4	8.0	7.1
Onega (143), entrance	63 56	38 01	+4 20	1.90	9.1	7.8	6.8
Ostrov Paskanets (145)	63 53	37 18	+3 40	1.90	9.1	7.8	6.8
Ostrov Nyapa (146)	64 02	37 09	+3 35	1.66	8.0	6.8	6.0
Guba Unezhma (148)	63 55	36 45	+3 25	1.54	7.4	6.3	5.5
Ostrov Malaya Korepalka (150)	64 01	36 35	+3 20	1.47	7.1	6.0	5.3
Ostrov Kondostrov (153)	64 12	36 37	+3 40	1.30	6.2	5.3	4.7
Mys Ponomarev Nos (151)	64 08	36 14	+3 15	1.12	5.4	4.6	4.0
Ostrov Parusnitsna (152)	64 11	36 18	+3 05	1.32	6.3	5.4	4.8
Ostrov Berezhenoy Borshovets (157)	64 21	36 07	+2 20	1.12	5.4	4.6	4.0

H — Time difference for high water only.
L — Time difference for low water only.
* U.S.S.R. Tide Tables, and Tide Tables, Atlantic Ocean, of the U.S. Coast and Geodetic Survey.

TABLE III - 5 (Continued)

PLACE AND REF. NO. (Figs. III - 51, III - 52, and III - 53)	LOCATION		TIDAL DIFFERENCES		TIDAL RANGES		
			Times	Heights			
	Lat. (N)	Long. (E)	Time of HW & LW	Ratio for HW & LW	Spring	Mean	MSL
	° ′	° ′	hr. min.		ft.	ft.	ft.
			Time Meridian 30° E				
Beloye More (109) (Continued)			*Reference Station: Kem' (176)*				
Ostrov Razostrov (160)	64 24	35 26	+1 30	1.00	4.8	4.1	3.6
Ostrov Sumostrov (165)	64 23	35 14	+1 00 H +1 55 L	1.00	4.8	4.1	3.6
Ostrov Molchanov (167)	64 30	35 02	+1 00 H +1 45 L	0.88	4.2	3.6	3.2
Bol'shoy Soroskiy Reyd (170)	64 34	34 56	+1 25	0.94	4.5	3.9	3.4
Ostrov Bol'shoy Zhuzhmuy (161)	64 39	35 35	+1 05	0.54	2.6	2.2	1.9
Lukovatyy (172)	64 49	35 00	+0 40	0.79	3.8	3.2	2.8
Ostrov Nemetskiy Kuzov (173)	64 57	35 08	+0 20	0.64	3.1	2.6	2.3
Ostrova Rombaki (175)	65 02	35 02	−0 05	1.00	4.8	4.1	3.6
KEM' (176)	64 59	34 47	(see predictions) *		4.8	4.1	3.6
Guba Pon'gama (183)	65 19	34 34	−0 20	0.96	4.6	3.9	3.5
Guba Kalgalaksha (186), entrance	65 40	34 53	−0 35	0.97	4.7	4.0	3.5
Kalgalaksha (187)	65 46	34 41	+0 10	0.94	4.5	3.9	3.4
Kandalakshkaya Guba (189)							
Gridina Guba (188)	65 54	34 40	−1 10	1.04	5.0	4.3	3.7
Guba Keret' (195)	66 18	33 36	−1 10	1.11	5.3	4.6	4.0
Kovda (208), entrance	66 42	32 53	−1 15	1.27	6.1	5.2	4.6
Kandalaksha (221)	67 08	32 25	−1 15	1.70	8.2	7.0	6.1
Guba Bol'shaya Por'ya (231)	66 46	33 48	−1 25	1.14	5.5	4.7	4.1
Guba Tar (232)	66 42	32 53	−1 20	1.14	5.5	4.7	4.1
Guba Malaya Pir'iu (238)	66 42	34 20	−1 15	1.11	5.3	4.6	4.0
Olstrov Vol'ostrov (241)	66 37	34 21	−1 15	1.10	5.3	4.5	4.0
Mys Turiy (243)	66 33	34 31	−1 20	1.09	5.2	4.5	3.9
Varzuga (247), entrance	66 16	36 58	−1 15	0.83	4.0	3.4	3.0
Tetrino (249)	66 04	38 17	−1 45	1.00	4.8	4.1	3.6
OSTROV SOSNOVETS (259)	66 29	40 41	(see predictions) *		12.0	10.0	8.0
Tri Ostrova (267)	67 06	41 23	−0 40	1.56	18.7	15.6	12.5
Mys Orlov Terskiy Tolstyy (268)	67 12	41 20	−0 55	1.47	17.6	14.7	11.8
Guba Gorodetskaya (273)	67 43	40 57	−2 25	1.41	16.9	14.1	11.3
			Reference station: Yekaterininskaya Gavan' (335)				
Murmanskiy Bereg (311)							
Ostrov Zelenyy (284)	68 02	39 37	+1 50	1.54	15.2	12.2	10.8
Guba Gremikha (286)	68 04	39 30	+1 55	1.54	15.2	12.2	10.8
Guba Savikha (289)	68 11	39 07	+1 40	1.50	14.8	11.8	10.5
Guba Drozdovka (293)	68 20	38 25	+1 25	1.38	13.7	10.9	9.7
Guba Vostochnaya Litsa (296)	68 38	37 48	+1 20	1.30	12.9	10.3	9.1
Semiostrovskiy Reyd (297), SE entrance	68 44	37 30	+1 05	1.23	12.2	9.7	8.6
Kharlovka (299), mouth	68 47	37 20	+1 10	1.22	12.1	9.6	8.5
Guba Rynda (300)	68 55	36 50	+1 00	1.13	11.2	8.9	7.9
Guba Porchnikha (303)	69 05	36 18	+0 45	1.14	11.3	9.0	8.0
Guba Podpakhta (305)	69 09	35 56	+0 40	1.13	11.2	8.9	7.9
Guba Teriberskaya (309)	69 11	35 08	+0 20	1.04	10.3	8.2	7.3
Maloye Olen'ye (310)	69 15	34 42	+0 15	1.04	10.3	8.2	7.3
Mys Mogil'nyy (312)	69 19	34 20	+0 15	1.07	10.6	8.5	7.5
Mys Byk (315)	69 20	33 58	+0 10	1.00	9.9	7.9	7.0
Guba Dolgaya Zapadnaya (316)	69 17	33 52	0 00	1.00	9.9	7.9	7.0
Guba Zelenetskaya Zapadnaya (317)	69 18	33 45	0 00	1.00	9.9	7.9	7.0
Kol'skiy Zaliv (340)							
Guba Sayda (338)	69 15	33 15	+0 05	1.00	9.9	7.9	7.0
Guba Bol'shaya Volokovaya (319)	69 16	33 36	0 00	1.00	9.9	7.9	7.0
Guba Olen'ya (337)	69 13	33 21	0 00	1.00	9.9	7.9	7.0
YEKATERININSKAYA GAVAN' (335)	69 12	33 28	(see predictions) *		9.9	7.9	7.0
Mys Velikiy (332)	69 05	33 17	0 00	1.00	9.9	7.9	7.0
Mys Bazisnyy (324)	69 01	33 04	+0 15	1.00	9.9	7.9	7.0
Mys Drovyanoy (328)	68 56	33 01	+0 35	1.00	9.9	7.9	7.0
Kola (326)	68 53	33 01	+1 00	1.00	9.9	7.9	7.0
Port-Vladimir (347)	69 25	33 09	0 00	1.00	9.9	7.9	7.0
Guba Kislaya (349)	69 23	33 05	−0 05	0.94	9.3	7.4	6.6
Guba Nasha (351)	69 23	32 55	−0 05	1.00	9.9	7.9	7.0

H — Time difference for high water only.
L — Time difference for low water only.
* U.S.S.R. Tide Tables, and Tide Tables, Atlantic Ocean, of the U.S. Coast and Geodetic Survey.

TABLE III - 5 (Continued)

PLACE AND REF. NO. (Figs. III - 51, III - 52, and III - 53)	LOCATION		TIDAL DIFFERENCES		TIDAL RANGES		
			Times	Heights			
	Lat. (N)	Long. (E)	Time of HW & LW	Ratio for HW & LW	Spring	Mean	MSL
	° ′	° ′	hr. min.		ft.	ft.	ft.
			Time Meridian 30° E				
Murmanskiy Bereg (311) (Continued)			*Reference Station: Yekaterininskaya Gavan' (335) (Continued)*				
Motovskiy Zaliv (352)							
Guba Ara (354)	69 26	32 51	—0 05	1.00	9.9	7.9	7.0
Ostrova Vichany (356)	69 28	32 39	—0 15	1.00	9.9	7.9	7.0
Guba Zapadnaya Litsa (357)	69 29	32 30	—0 05	1.00	9.9	7.9	7.0
Guba Titovka (358)	69 35	32 04	0 00	1.00	9.9	7.9	7.0
Guba Motka (359)	69 40	32 10	—0 05	1.00	9.9	7.9	7.0
Bukhta Ozerko (360)	69 44	32 09	—0 10	1.00	9.9	7.9	7.0
Guba Yena (361)	69 38	32 25	0 00	1.00	9.9	7.9	7.0
Guba Malaya Korabel'naya (363)	69 35	32 45	0 00	1.00	9.9	7.9	7.0
Guba Bol'shaya Korabel'naya (366)	69 41	33 06	—0 05	1.00	9.9	7.9	7.0
Guba Zubovskaya (368)	69 47	32 41	—0 15	1.01	10.0	8.0	7.1
Guba Vayda (370)	69 56	32 00	—0 30	0.98	9.7	7.7	6.9
Zemlyanoye (371)	69 47	31 56	—0 40	0.95	9.4	7.5	6.6
Devkina Zavod' (372)	69 39	31 22	—0 35	0.91	9.0	7.2	6.4
Guba Bazarnaya (373)	69 46	31 02	—0 30	0.93	9.2	7.3	6.5

H — Time difference for high water only.
L — Time difference for low water only.
* U.S.S.R. Tide Tables, and Tide Tables, Atlantic Ocean, of the U.S. Coast and Geodetic Survey.

TABLE III - 6

TIDAL CURRENTS, NORTH COASTAL SECTOR

Except as noted, times are in solar hours before (−) or after (+) local high water (H), local low water (L), or local moon's meridian passage (MM).

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Novaya Zemlya (2)									
Karskoye More (18)	73 00	62 00	....	....	....	....	....	....	In the central part of the sea the nontidal current is weak and there is said to be a slight northward drift. Currents caused by winds are important and at times attain considerable velocity. Ice in the open sea under the influence of currents and winds is said to move with velocities of from 1 to 3 knots at times. In the open areas of the sea the velocity of the currents is from less than ½ to 1 knot. Near the shore it may be considerably greater.
Savvina (3)	71 32	55 43	....	....	....	....	....	....	There is a strong current in the Savvina.
Proliv Karskiye Vorota (6)	70 25	57 50	....	....	....	....	....	....	Currents in Proliv Karskiye Vorota are very complicated. Off the coast of Novaya Zemlya (2) the surface current flows from Karskoye More (18) into Barents Sea (1) while off the coast of Ostrov Vaygach (27) a reverse current flows into Karskoye More. The water in more than half the width of the strait in the vicinity of Ostrov Vaygach flows toward Karskoye More. At times the direction of the flow in the entire strait is northeastward. The wind affects the velocity and direction of the flow. After northeast winds the velocity may be increased to 2½ knots whereas it is usually between ½ and 1 knot. Sometimes a change in the direction of the current indicates a coming change in the wind. In February 1920 when a southwest wind was blowing with a force of from 11 to 33 nautical miles per hour, an icebreaker was carried with the ice through the middle of the strait with a velocity of from 4 to 5 knots. The currents are strongest in the southeastern part of Proliv Karskiye Vorota (6) and weakest in the middle. Rips and rapids form on the surface of the water where the currents are strong. The nontidal current in the eastern part of the strait flows northeastward with a velocity of one knot or more. In the vicinity of Mys Rogatyy (31) velocity is 1.3 knots. Reference 69, Topic 37 gives details of current movement in Proliv Karskiye Vorota.
SE part	70 25	58 15	....	2½	....	2½	....	....	
middle	70 30	58 00	....	½-¾	....	½-¾	....	....	
Guba Kamenka (4), shoals off entrance to	70 35	57 30	....	....	....	....	....	....	Currents in the vicinity of the shoals lying off Guba Kamenka vary in direction and velocity.
Banka Perseya (5)	70 25	57 30	....	....	....	....	....	....	A very strong current has been observed flowing over Banka Perseya.
Petukhovskiy Shar (9)	70 34	56 25	E	½	W	½	....	....	....
Proliv Kostin Shar (14), off S entrance	70 50	53 00	....	....	....	....	....	....	The current sets constantly northwestward off the southern entrance to Proliv Kostin Shar.
Ostrov Kruglyy (13), off S extreme of	71 04½	53 36	....	....	....	....	....	....	Rapids.
Ozero Nekhvatovo Pervoye (15)	71 16	53 31	....	....	....	....	....	....	The outlet from Ozero Nekhvatovo Pervoye is encumbered with rapids.
Guba Belush'ya (16)	71 30	52 18	....	....	....	....	....	....	Currents are weak and variable in Guba Belush'ya.
Proliv Yugorskiy Shar (23) to Beloye More (109)									
Proliv Yugorskiy Shar (23)	69 40	60 20	Wwd	....	Ewd	....	L	H	Currents in Proliv Yugorskiy Shar depend greatly upon the force and direction of the wind. Usually currents set along the deep water channels in the strait, except near times of slack. Countercurrents have been observed frequently along the shore. In addition to the tidal currents there is a weak surface current of about ½ knot, from the Barents Sea (1) to Karskoye More (18). Strong, continuous, northeasterly winds create a westward current which frequently is stronger than the tidal current combined with the regular eastward flow. This current from Karskoye More sometimes reaches a velocity of 4½ knots in the narrows. Time of slack is for the narrows of Proliv, Yugorskiy Shar.

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Roadstead off radio station (24)	69 49	60 43	Swd	....	Nwd	....	L+2 2/3	H+2 2/3	In the roadstead at the radio station the velocity reaches 0.8 knot, but out in the middle of the strait off the radio station it is considerably stronger.
Khaborovo (25), vicinity	69 40½	60 26	....	1.3-1½	....	1.3-1½	....	....	Strength of flood and ebb is during time of spring tides.
Mys Peschanyy (28), S of	69 41½	60 25	....	3½	....	3½	....	....	....
Narrows (26)	69 40½	60 21.8	....	2½	....	2½	....	....	....
Guba Varneka (34)	69 40	60 05	....	....	....	....	....	....	Guba Varneka is free of the Proliv Yugorskiy Shar (23) currents.
W entrance	69 38	60 05	....	....	....	....	....	....	Influence of flood current from Barents Sea (1) is felt at the western entrance to Proliv Yugorskiy Shar (23).
Between Proliv Yugorskiy Shar and Ostrov Matveyev (35)	69 30	59 30	....	....	....	....	....	....	Between Proliv Yugorskiy Shar (23) and Ostrov Matveyev irregular currents setting N or NNW with velocities up to 4 knots have been reported.
Aleksandrovskaya Mel' (38), channel N of E end	68 48	55 48	SW	3	NE	3	....	....	....
Channel E of	68 43	55 48	SW	3	NE	3	....	....	....
SE of	68 40	55 47	W	....	E	....	....	....	....
Mys Konstantinovskiy (39), W of	68 32	55 00	S	1½	N	1½	....	....	....
Bolvanskaya Guba (40)	68 15	54 45	Swd	1½-2	Nwd	1½-2	....	....	The velocity of the currents in Bolvanskaya Guba may increase to 3½ knots during gales. Water in this bay during ebb is almost fresh.
Pechora (43), bar	68 24	54 25	SWwd	....	NEwd	....	....	....	....
Ostrov Kolguyev (46), E coast	69 10	50 15	....	....	....	....	....	....	At times a nontidal current sets northward along the eastern coast of Ostrov Kolguyev.
Pyusha (50)	66 57	47 50	....	....	....	....	....	....	Currents are very strong in the mouth of the Yegorova (52) and off Zemlyanichni (51). Countercurrents are especially strong in these localities.
Beloye More (White Sea) (109)									There are strong tidal currents in the Beloye More. Durations of flood and ebb are nearly equal, except near the mouths of large rivers such as the Mezen' (72), Severnaya Dvina (105), and Onega (143) where the ebb lasts longer than the flood, especially during the spring months. In the northern part the currents are rotary, turning clockwise. In the southern part of the Gorlo (257) and also in the Dvinskaya Guba (108) and Onezhskaya Guba (132) changes from flood to ebb and ebb to flood are abrupt and accompanied by eddies which cause a foam on the crest of the waves resembling breakers. However, in the basin of Beloye More at the time of change, the currents become weak and start to flow immediately from the opposite direction. Near the shore currents turn earlier in places farther seaward—sometimes, a difference of one hour. Although the main part of the flood follows the direction of the Gorlo (257), part of it flows strongly onto the shore between Reka Mayda (85) and Mys Intsy (88). At 3 or 4 miles offshore the flood flows parallel to the coast. At a number of places the current at a depth of 5 fathoms was found to have the same velocity as at the surface. Strong northerly winds increase the velocity of the flood and strong southerly winds increase that of the ebb. The hourly velocities and directions of the tidal currents in the Beloye More from the entrance through the Gorlo (257) are given in Reference 66, Topic 37.
Poluostrov Kanin (54), coast	67 30	43 30	....	....	....	....	....	....	Along the coast of Poluostrov Kanin are many banks, and currents are very strong and irregular. Sometimes they have a velocity of 5 knots. In the channel along this coast the currents generally flow parallel to the coast. Off the mouths of large rivers the flood sets into the entrance and the ebb out. The flood is south-

									eastward and the ebb northwestward in the deep channel between the shoals off Mys Konushin (61) and the shoals which surround Ostrov Morzhovets (82). In the vicinity of the last named shoals the currents are irregular.
Mys Kanin Nos (55), NW of	68 45	43 20	SE	....	NW	....	....	....	Tidal and ocean currents around Mys Kanin Nos are very strong. Those northward are strong and irregular, sometimes attaining a velocity of 5 knots.
3½ mi. WSW of	68 39½	43 12½	(Table III - 8)		....	....	....	....	....
15½ mi. WSW of	68 33	42 40	(Table III - 8)		....	....	....	....	....
Bolshaya Bugryanitsa (57), off	68 10	44 15	....	....	....	....	..	...	Northward of Bolshaya Bugryanitsa the northward current sets toward the coast. Southward of this river the southward current sets southeastward toward the coast.
5 mi SSW of	68 09½	44 09	(Table III - 8)		....	....	....	....	....
Shoyna (58), main channel	67 54	44 10	....	....	....	....	....	....	The flood flows up Shoyna for a distance of 11½ miles.
Kiya (59), entrance	67 41	44 03	SE	strong	NW	....	....	....	....
4 mi. W of	67 41	44 35	(Table III - 8)		....	....	....	....	....
Mys Lagyshev (60)	67 32	43 55	SSW	....	NNE	....	....	....	....
14 mi. SW of	67 22.2	43 34	(Table III - 8)		....	....	....	....	....
Mezenskaya Guba (65)	....	....	....	....	....	....	....	....	The flood enters the Mezenskaya Guba on both sides of Ostrov Morzhovets (82) setting approximately southeast along the northeastern side and east-southeast along the southern side of the island. The two branches unite eastward of the island forming heavy tide rips. It has a velocity of about 3 knots at strength in the vicinities of the mouths of the Mezen' (68) and Kuloy (75). The direction of the ebb is in general opposite to that of the flood. Its velocity reaches 4½ knots in places. The flood sets southward along the banks extending off the east coast of Mezenskaya Guba (65) until the height of the tide exceeds the level of the banks, when it, as a 6-foot bore, rushes eastward over them toward shore. Usually the bore occurs about 4 hours before high water. The great force of the roller may carry a vessel onto the bank. The bore is felt to a lesser degree on the shoals east of Ostrov Morzhovets (82) and on the shoals at the mouths of the Mezen' (68) and Kuloy (75), especially off Mys Apovskiy (73) and Mys Kargovskiy (74).
Mys Konushin (61), 3½ mi. WSW of	67 10½	43 38½	SSE	2½	NNW	2½	MM+6¾	MM	....
6 mi. SSE of	67 06	43 51	SE	2½	NW	2	MM+6¼	MM	....
16½ mi. WSW of	67 05½	43 08½	(Table III - 8)		....	....	....	....	....
14 mi. WSW of	67 05	43 15	(Table III - 8)		....	....	....	....	....
11½ mi. SW of	67 04.8	43 26	(Table III - 8)		....	....	....	....	....
22 mi. SW of	67 00	43 02	(Table III - 8)		....	....	....	....	....
Konushinskaya Zavod' (62)	67 08½	43 53	E	3	....	....	....	....	Rips occur off the entrance to Konushinskaya when the direction of the current changes.
Chizha (64), outer part of channel	67 05	44 09	SEwd	1	NWwd	....	....	....	The velocity of the ebb in Chizha is more uniform and greater than that of the flood. The ebb in the river flows with great force against the northern bank at the mouth.
off entrance	67 05½	44 15½	SEwd	2	NWwd	....	....	....	do.
Mouth	67 05½	44 21	....	3½	....	....	....	....	do.
Nes' (66)	66 40	44 32	E	3	....	....	....	....	....
Nizhnyaya Mgla (67)	66 32	44 23	SE	2-3	....	....	....	....	....
Mezen' (river) (68), entrance	66 10	44 01	SSE	3	....	....	H—5	H	A bore about 4 feet high sweeps over the shoals on both sides of Mezen' entrance, about 4¾ hr. before high water. When the water begins to rise and before the banks are covered, the current sets through the river channel and after the banks are covered, it occupies the whole width of the river and rushes over the banks toward the side of the channel. This causes a strong cross-current which may ground a vessel traveling in the channel. At first the ebb sets over the banks along Mezen' (68) at a moderate rate, but when the banks dry and the stream is confined to the channel the ebb velocity increases to 4 or 5 knots.

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Mezen' (72)	65 40	44 12	....	....	....	strong	....	....	The tidal influence is felt 100 miles up Mezen' (68), but salt water reaches only a little above the town of Mezen' (72). Duration of flood in Mezen' (68) is about 4 hr. and that of ebb 8 hr. The change is rapid, causing tide rips.
Mys Apovskiy (73), off	66 12½	43 51	....	....	....	....	....	....	Strong rips.
Mys Kargovskiy (74), off	66 12½	43 43	....	....	....	....	....	....	As the ebb leaves the mouth of Reka Kuloy (75), it separates into two parts. The first, the northern stream, flows along the west side and turns north-northwestward at Mys Nerninskiy (77). Vessels must guard against the ebb setting them onto the banks northwestward of the river mouth. Opposite the mouth of Nizha (78) it turns northwestward and flows past Mys Abramov (79) and S of Ostrov Morzhovets (82). The second or southern stream flows along the southeastern side of the entrance. At Mys Kargovskiy (74) it encounters the ebb from Mezen' (68) forming tide rips. From Mys Kargovskiy (74) the southern ebb from Reka Kuloy (75) turns northward and then north by westward flowing out of Mezenskaya Guba (65). Rips off Mys Kargovskiy (74) are particularly strong during ebb and at the beginning of flood. The flood drives with great force upon the reef.
Kuloy (75), off the entrance	66 15	43 47	SSW	2½-3	....	1½-2½	....	....	....
Entrance	66 12	43 39	SW	2½-3	NNE	3½-4½	....	....	....
3 mi. inside entrance	66 11	43 35	....	2½-4½	....	3½-4½	....	H	....
Dolgoshchel'ye (76)	66 02½	43 28	....	4½	....	3½-4½	....	....	Duration of flood is 4 hr. and that of ebb is 8 hr. About ¾ to 1¼ hr. after the flood begins to flow at Dolgoshchel'ye a tidal wave, which can be heard for a distance of two miles, sweeps over the sands opposite the village. By riding this wave, boats can save a 5-mile pull.
Above Dolgoshchel'ye (76)	65 52	43 30	....	1½	....	3½	....	....	The flood is felt as far upstream as 50 miles from the mouth of Reka Kuloy (75).
Mys Nerninskiy (77), off	66 15	43 45	....	....	....	....	....	....	Part of the flood stream from Mezenskaya Guba (65) flows south-southeastward, rounds Mys Nerninskiy and then flows into the mouth of Kuloy (75). The flood is particularly dangerous because it sets toward the banks southeastward of the river entrance.
Mys Abramov (79), 9½ mi. NNW of	66 32.7	43 06½	(Table III - 8)		....	....	....	....	....
Koyda (80)	66 24	42 39	....	....	....	....	....	....	At first the flood flows along the Koyda channel. When it rises above the coastal shoals, it rolls over them in a surge, forming surfs which are dangerous to vessels.
Ostrov Morzhovets (82), vicinity	66 45	42 32	....	....	....	....	....	....	The southeastward flood along both sides of Ostrov Morzhovets begins at the northern end about 8 hr. after the moon's meridian passage. These streams meet southeastward of the island and flow toward Mezen' (68) and Kuloy (75). There is a strong eddy between this meeting place and the island. The flood sets along the mainland coast south of Ostrov Morzhovets (82) toward Mys Abramov (79).
4½ mi. SSW of S tip	66 35½	42 39	(Table III - 8)		....	....	....	....	....
6 mi. W of W Lt. on	66 44.7	42 16	(Table III - 8)		....	....	....	....	....
16 mi. NNE of Lt. at S end of	66 57½	42 49	(Table III - 8)		....	....	....	....	....
Between Mys Voronov (83) and Ostrov Morzhovets (82)	66 35	42 22	SE	strong	NW	strong	.. .	....	Between Mys Voronov and Ostrov Morzhovets the flood sets into Mezenskaya Guba (65) and the ebb in the opposite direction.
Between Mys Voronov (83) and Mys Veprevskiy (92)	66 31 to 65 39	42 16 to 39 50	....	....	....	2.0	....	....	Off the east side of the Gorlo (257) from Mys Voronov to Mys Veprevskiy the current changing from flood to ebb turns in a clockwise direction. At the beginning of the ebb period the velocity is from 0.1 to 1.2 knots, during the middle of the period the velocity is from 0.7 to 2.0 knots, and at the end of the period the velocity is 1.0 knot or less.

Mys Voronov (83), 9 mi. WNW of	66 34	41 58	(Table III - 8)		....	....	....	....	....
Bol'shaya Kedovka (84)	66 29½	42 08	....	....	....	....	....	....	In Bol'shaya Kedovka the ebb is strong during freshets.
Mayda (85)	66 20	41 53	....	weak	....	strong	....	....	....
Coast N of Megra (86)	66 12	41 35	....	1.4	....	....	....	....	....
Megra (86) to Mys Medvezhiy (89)	66 10 to 65 53	41 22 to 40 26	....	1.4	....	....	....	....	....
Ruch'i (87)	66 02½	41 16	....	weak	....	strong	....	....	....
Mys Intsy (88), 5 mi. N of	66 04	40 43	(Table III - 7)		....	....	....	....	....
4 mi. NNW of	66 02.7	40 45.2	(Table III - 8)		....	....	....	....	....
5 mi. WSW of	65 57¾	40 33	WSW	....	ENE	1½	....	....	....
22 mi. W of	65 58.2	39 54.2	(Table III - 8)		....	....	....	....	....
Bol'shiye Intsy (88)	65 57¼	40 41	....	weak	....	very strong	....	....	Rips are formed when the flood enters Bol'shiye Intsy and encounters the river current.
Mys Medvezhiy (89), 7 mi. WNW of	65 54	40 17	SW	1½	NE	1½	....	....	....
Tova (90)	65 46½	40 25	....	....	....	4	....	....	....
9 mi. W of	65 46	40 04	(Table III - 7)		....	....	....	....	....
Zolotitsa (91), outside bar	65 42	40 11	Swd.	2	....	....	....	....	....
In river	65 41	40 11	....	0.7	NNW	2	....	....	In Zolotitsa the flood is felt for a distance of only 5 or 6 miles above the entrance.
8½ mi. W of entrance	65 42	39 51	....	2.1	....	....	....	....	....
Mys Veprevskiy (92), off	65 37	39 48	SSE	....	NNW	....	....	....	One mile off Mys Veprevskiy (92) the flood is very weak, but farther off it is stronger.
4 mi. NW of	65 40½	39 46	SW	1½	NE	1½	....	....	....
5 mi. NW of	65 40.1	39 46.3	(Table III - 8)		....	....	....	....	....
18 mi. W of	65 39.6	39 12.6	(Table III-8)		....	....	....	....	....
S entrance to Gorlo (257)	65 40	39 00	....	....	....	....	....	....	The flood from the Gorlo sets into Dvinskaya Guba (108), Onezhskaya Guba (132), and Kandalakshskaya Guba (189). Along the coast westward of Kamenka (71) it sets WNW with a velocity of 2 knots at times.
Mys Zimnegorskiy (94), 6½ mi. NW of	65 34	39 30	....	0.7	....	....	....	....	....
2½ mi. W of	65 29	39 36	....	1.7	....	....	....	....	....
Dvinskaya Guba (108), center of gulf	64 50	39 40	SEwd	2	....	....	....	....	The ebb flows northwestward through Dvinskaya Guba and then northeastward into the Gorlo (257). The tidal currents in the channels in the southern part of Dvinskaya Guba and approaches to Arkhangel'sk (105) are extremely complicated. Detailed sources listed in Topic 37 should be consulted for information.
Mys Zimnegorskiy (94) to Ostrov Mud'yugskiy (100), 1 mi. offshore	65 29 to 64 56	39 39 to 40 10	SSE	....	NNW	....	....	....	....
Mys Kerets (95), 5½ mi. W of	65 20½	39 30	(Table III - 7)		....	....	H—1	....	The times of slacks along the east shore of the Gorlo (257) are about the same as in the middle. Time given is of high water at Ostrov Sosnovets (259).
5 mi. S of	65 15	39 41½	(Table III - 7)		....	....	....	....	....
12 mi. W of	65 20	39 15	(Table III - 7)		....	....	....	....	....
7 mi. WSW of	65 16.8	39 31.8	(Table III - 8)		....	....	....	....	....
Malyye Kozly (96), 1 mi. offshore	65 16½	39 48	....	very weak	....	very weak	....	....	....
Bol'shiye Kozly (97), 1 mi. offshore	65 14½	39 51	....	very weak	....	very weak	....	....	The wind influences the currents off Bol'shiye Kozly and Kuya (98). In Kuya (98) the flood is of short duration and flows only 0.3 mile up the river.
Kuya (98)	65 05	40 05	....	weak	....	1½	....	....	do.
Syuz'ma (107), 4 mi. N of	64 46	39 05½	ESE	1	WNW	1½	MM	MM+6¼	....

[redacted]

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Unskaya Guba (113), outside entrance	64 50	38 30	ESE	1½	WNW	1½	MM	MM+6	....
Entrance	64 49	38 25	SSW	2	N	....	MM	MM+5	In the entrance to Unskaya Guba the flood sets toward Mys Krasnogorskiy Rog (111), and the ebb sets toward Mys Yarengskiy Rog (112).
Inside	64 45	38 10	WSW	½-0.7	ENE	½-0.7	....	....	....
Narrow branch at south side of	64 40	38 08	....	very weak	....	very weak	....	....	....
Onezhskaya Guba (132)	65 00	36 00	Swd	3-3½	Nwd	3-3½	MM+2	MM+8	In the Onezhskaya Guba the current changes from ebb to flood from 3 to 1 hours before high water at Kem' (176). The change from flood to ebb occurs from 3 to 4 hours after high water at Kem' (176). The flood sets generally southward and the ebb northward. *5 hr. before high water at Kem' (176).* Currents are ebbing throughout the bay. In the eastern half the velocities are 1.7 to 1.8 knots; in the western half they are 0.2 to 1.0 knot. In the eastern strait, between Mys Letniy Orlov (131) and Ostrov Solovetskiy (120), the velocities are 1.8 to 2.7 knots and farther northward they are 0.9 to 1.0 knots. In the western strait, near Severnyy Kemskiy Stamik (182), the velocity is 0.9 to 1.1 knots. Between Ostrov Bol'shoy Zhuzhmuy (161) and Ostrov Solovetskiy (120) the currents are weak and irregular. Off some of the capes, such as Mys Chesmenskiy (135), southward currents are noted. *4 hr. before high water at Kem' (176).* The current is still ebbing but with decreased velocities. In the eastern half the velocities are 1.3 to 1.7 knots; in the western half 0.3 to 0.9 knot; between Mys Letniy Orlov (131) and Ostrov Solovetskiy (120) they are 1.8 to 1.9 knots and in the western strait they are 0.4 to 1.0 knot. The flood is starting in the strait east of Ostrov Anzerskiy (117). North of Ostrov Bol'shoy Zhuzhmuy (161) the directions of the ebb current are more variable than during the previous hour. *3 hr. before high water at Kem' (176).* In the eastern half of the bay the velocities are 0.9 to 1.3 knots; in the western half 0.2 to 0.4 knot. In the eastern strait the current is ebbing with a velocity 1.0 to 1.6 knots except off Ostrov Anzerskiy (117). In the northern part of the eastern strait the velocities are 0.7 to 0.8 knot. There is a southward flood starting in the western strait. North of Ostrov Bol'shoy Zhuzhmuy the flood starts with a westerly trend. The current is still ebbing south of that island. *2 hr. before high water at Kem' (176).* In the eastern strait the current is flooding with a velocity of 0.3 to 1.2 knots except in a narrow strip along the mainland. The flood in the western strait has a velocity of 0.4 to 1.3 knots. North of Ostrov Bol'shoy Zhuzhmuy the flood has a velocity of 0.3 to 0.6 knot. Along the eastern shore from Mys Liamtsy (137) to north of Mys Chesmenskiy (135) the ebb continues with a velocity of 0.4 to 0.7 knot. The flood starts in the southern part of the gulf. *1 hr. before high water at Kem' (176).* The currents are flooding everywhere except along the shore of the eastern strait. The velocities in the eastern strait are 1.0 to 1.5 knots; in the western strait 0.6 to 1.4 knots; in the reach north of Ostrov Bol'shoy Zhuzhmuy (161) 0.4 to 1.2 knots, and in the area of Ostrov Golomyannyy (158) to Mys Ponomarev Nos (151) the velocities are 1.2 to 0.9 knots. *High water at Kem' (176).* The current is flooding everywhere except near Ostrov Zhizhginskiy (115) where there is a stream from the gulf along the mainland shore. The velocities in the eastern half are 0.5 to 0.8 knot, in the straits they are 1.0 to 2.0 knots, and in the southern part of the western half they are 0.6 to 1.6 knots.

[redacted]

									1 hr. after high water at Kem' (176). Directions of the current are the same as in the preceding hour. Velocities in the eastern strait between Mys Letniy Orlov (131) and Ostrov Solovetskiy (120) are 1.7 to 1.8 knots; in the western strait they are 1.0 to 1.3 knots. The stream off the mainland near Ostrov Zhizhginskiy (115) has increased to 0.5 knot. The velocities in the southern part of the gulf are 0.7 to 1.4 knots.
									2 hr. after high water at Kem' (176). The currents are the same but with weaker velocities than during the preceding hour.
									3 hr. after high water at Kem' (176). In most of the areas the flood is becoming irregular. The velocities in the eastern half of the gulf are 1.0 to 1.2 knots; in the western, 0.2 to 0.7 knot; in the eastern strait, 0.6 to 1.8; and in the western strait from 0.2 to 0.5 knot. In a few places in the eastern strait, the center of the western strait, and N of Ostrov Bol'shoy Zhuzhmuy (161) the current has started to ebb.
									4 hr. after high water at Kem' (176). The current is ebbing everywhere except off Ostrov Anzerskiy (117) where the flood is weak. The ebb velocities in the open part of the gulf are 0.3 to 0.7 knots, and in the straits are 0.8 to 1.4 knots.
									5 hr. after high water at Kem' (176). The current is ebbing everywhere. Velocities in the eastern strait are 1.2 to 1.8 knots, in the western strait 0.9 to 1.3 knots, and in the open part of the gulf are 0.4 to 1.8 knots.
									6 hr. after high water at Kem' (176). Currents continue to ebb. Velocities in the eastern strait are 1.6 to 2.6 knots, in the western strait 0.8 to 1.4 knots, and in the open part of gulf 0.5 to 1.5 knots.
Eastern strait	65 07	36 30	....	....	....	....	....	....	The flood flows into Onezhskaya Guba (132) in a southwestward direction. Off Ostrov Solovetskiy (120) it divides into three streams. The eastern stream flows between Ostrov Zhizhginskiy (115) and Ostrov Anzerskiy (117). The middle one is between Ostrov Anzerskiy (117) and Ostrov Solovetskiy (120). In the eastern strait between Ostrov Anzerskiy (117) and Mys Letniy Orlov (131) the flood sets toward the mainland and Mys Letniy Orlov (131), and the ebb sets toward Ostrov Anzerskiy (117).
Ostrov Zhizhginskiy (115) NW side of	65 13	36 46	SW	2	NE	2	MM+2	MM+7	The current NW of Ostrov Zhizhginskiy is somewhat rotary, turning clockwise.
1 mi. off E shore of	65 12	36 52	....	....	NNE to NE	1½	MM+2	MM+7	....
1 mi. off SW shore of	65 11	36 45	SWwd	1	....	....	....	....	Close to the Ostrov Zhiahginskiy shore the flood velocity is less than one knot.
Zhizhginskaya Salma (116)	65 10	36 50	....	1½	NNE to NE	1½	MM+2	MM+7	In the eastern side of Zhizhginskaya Salma the ebb flows northward. The ebb in the strait flows toward Ostrov Zhizhginskiy (115).
Guba Letnyaya Zolotitsa (128)	64 57	36 48	SSE	....	NNW	....	....	....	....
Letnyaya Zolotitsa (129)	64 57	36 49	....	....	....	....	....	....	Rapids.
Mys Letniy Orlov (131), 5 mi. WNW of	64 57.8	36 15.7	(Table III - 8)		....	....	....	....	....
5½ mi. NW of	64 58	36 18	(Table III - 8)		....	....	....	....	....
Approx. ½ mi. off	64 55	36 25	....	3	....	3	....	....	Rips.
Along coast S of	64 48	36 20	SEwd	1¼	NWwd	1¼	MM+2½	MM+8½	....
Ostrov Solovetskiy (120), S of	64 55	35 50	SW	....	NE	....	....	....	....
Ostrov Anzerskiy (117), N side of	65 12	36 10	SW	1½	....	....	MM+2	MM+7	The flood north of Ostrov Anzerskiy flows strongly toward the northern side of the island and around each end.
Guba Troitskaya (118), entrance	65 11	36 00	SW	1½	....	....	....	....	....
3d reach	65 10	35 58½	....	weak	....	....	....	....	....
Anzerskaya Salma (119), middle strait	65 10	35 54	Swd	....	Nwd	....	MM+2	MM+7	About 3 miles north of Ostrov Anzerskiy (117) the southwestward flood turns southward and into the north entrance to Anzerskaya Salma (119), setting toward the shores of Ostrov Solovetskiy (120) and Ostrov Bol'shaya Muksalma (127).

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Anzerskaya Salma (119), Southern part	65 05½	36 05	SEwd	....	NWwd	....	....	....	The ebb entering the eastern entrance of Anzerskaya Salma (119) flows toward the southern shore of Ostrov Anzerskiy (117). Strong rips and whirls are formed on the shoal off the southeast side of Ostrov Bol'shaya Muksalma (127) when the southeastward flood in Anzerskaya Salma (119) meets the southwestward flood in the eastern channel. The two streams unite and flow southwestward.
Zaliv Solovetskiy (123)	65 00	35 39	SE	....	NW	....	....	MM+7	The flood in Zaliv Solovetskiy is perceptible only from 2 to 5 hr. and the ebb only from 8 to 11 hr. after the moon's meridian passage. Details of the currents in the channels of this bay and the other channels among the islands at the entrance to Onezhskaya Guba (132) are extremely complicated. For further information consult references listed in Topic 37.
Zaiatskaia Vorota (125)	64 58	35 39½	....	½	....	....	....	....	....
Ostrova Zayatskiye (124), E of	64 58	35 42	Swd	....	....	....	....	....	....
W of	64 58	35 37	SE	1½	NNW	....	....	....	....
Ostrova Sennukhi (126), vicinity	64 49	35 24	Swd	....	Nwd	2	MM+2	MM+9	Flood currents from the eastern and western straits and Anzerskaya Salma (119) meet in the vicinity of Ostrova Sennukhi (126). As the flood flows southward, it divides into two branches. One flows along the coast in the Onezhskiye Shkhery channel (157) and the other in the main part of Onezhskaya Guba (132) outside the skerries.
Guba Pushlakhta (133)	64 49	36 30	SEwd	1.3	NWwd	1.3	....	....	....
Mys Tonkiy (134), 2½ mi. SSW of	64 47	36 27	(Table III - 8)		....	....	....	....	....
Mys Chesmenskiy (135), 2½ mi. SE of	64 41	36 36	(Table III - 8)		....	....	....	....	....
Gryaznogubskiy Stamik (136)	64 33	36 23	....	....	....	....	....	....	Rips.
Lyamitskiye Stamiki (133)	64 21	36 50	....	....	....	....	....	....	Rips.
6½ mi. SSW of	64 20	37 01	(Table III - 8)		....	....	....	....	....
Mys Glubokiy (139), off	64 18	37 18	....	....	....	....	....	....	Off Mys Glubokiy (139) part of the flood flows eastward and the other part continues southeastward toward the Onega (143) with a maximum velocity of 3 to 3.5 knots.
Pil'yema (142)	64 01	38 04	....	....	....	....	....	....	Rapids.
Ostrov Kiy (141)	64 00	37 53	....	½-¾	....	....	H—5	H+1	....
W of	64 01	37 47	S to SE	½-¾	....	....	....	....	....
Onega (143), entrance	63 56	37 58	....	½-¾	....	2¼	....	....	At the entrance to the Onega the flood usually lasts 4½ hr. and the ebb 8 hr. The influence of the flood is felt 8 to 10 miles up the river. Most of the rivers along the western coast of the Beloye More (109) are not navigable because of the rapids.
Onezhskiye Shkhery (154)	64 15	36 20	....	2	....	3½	....	....	In the vicinity of the Onezhskiye Shkhery the current is said to shift its direction counterclockwise during the flood and clockwise during the ebb. Rips are formed in bends of channels in the skerries or where currents meet. When currents change, slight rips are visible.
Kushereka (144)	63 49	37 15	Wwd	½	Ewd	1-2	....	....	Rapids.
Guba Unezhma (148)	63 55	36 44	SE	....	NW	....	....	....	....
Unezhma (147)	63 54	36 46	....	....	....	....	....	....	Rapids.
Ostrov Nyapa (146), 5 mi. SSW of	63 59½	37 09	(Table III - 8)		....	....	....	....	....
Nyukhcha (149)	63 59	36 18	SE	....	NW	....	....	....	Rapids. The velocity in Nyukhcha is from 1 to 3 knots.
Ostrov Kondostrov (153)	64 13	36 38	SE	....	NW	....	....	....	Currents divide and flow along the east and west sides of Ostrov Kondostrov.

Kolezhma (156)	64 14	35 54	....	....	....	....	....	....	Flood streams meet on the southeast side of the island and cause strong rips. Rapids. Flood and ebb set in the direction of the channel which leads into Kolezhma. The flood is felt 5 miles up the river.
Kolezhma (town) (155), roads Kolezhemskiy Reyd	64 15½	36 00	(Table III - 8)		....	....	....	....	....
Ostrov Golomyannyy (158), W of	64 23	36 04	(Table III - 8)		....	....	....	....	....
Sumskaya Guma (163)	64 20	35 25	Swd	....	....	....	MM+5	....	Among the islands that lie off Sumaskaya Guba the flood sets southeastward causing rips and eddies off the southeast sides of the islands.
Bol'shoy Sed-Ostrov (159), vicinity	64 24	35 33	SW	1	NE	1½-2	MM+5	....	....
Ostrov Razostrov (160), vicinity	64 24	35 27	S	1	N	1½-2	MM+5	....	....
Ostrov Bol'shoy Zhuzhmuy (161), vicinity	64 39	35 36	Swd	3-3½	Nwd	3-3½	H−2	H+3½	Times are referred to times at Kem' (176).
10½ mi. ENE of	64 44	35 56.7	(Table III - 8)		....	....	....	....	....
SW of	64 35	35 33	SE	....	NW	....	....	....	Southwest of Ostrov Bol'shoy Zhuzhmuy the change from flood to ebb is rapid.
Suma (162)	64 17	35 24½	....	....	....	....	....	....	Rapids. The flood current in Suma is felt only as far upstream as the rapids.
Vir'ma Guba (166)	64 23	35 10	S	....	N to NW	....	....	....	....
Vir'ma (164)	64 20	35 12	....	....	....	....	....	....	Rapids.
Kuz Guba (168)	64 27	35 05	SSW	....	....	....	....	....	During the flood current there are strong rips and eddies on the southern sides of the islands in the entrance to Kuz Guba.
Kuz (169)	64 24½	34 57	....	....	....	....	....	....	Rapids. The flood in Kuz is felt only as far as the first rapids.
Bol'shoy Sorokskiy Reyd (170)	64 33	34 57	SW	1	....	2½	....	....	The flood in Bol'shoy Sorokskiy Reyd lasts about 4 hr. and the ebb about 8 hr. The flood is weak in the entrance to the river, and the currents are rapid higher up.
Passage between moles	64 32	34 50½	....	3-4	....	4-5	....	....	....
Mouth of the sea canal	64 30	34 48	....	....	....	over 2	....	....	Choppy.
Shuyskaya Salma (171)	64 46	34 54	SW	1	NE	over 1	....	....	The flood lasts for about 4 hr. and the ebb about 8 hr.
Kemskaya Guba (178)	64 58	34 46	....	....	....	2½	....	....	The river current in Kemskaya Guba decreases the flood and increases the ebb.
Kemskaya Salma (179)	64 59	34 47½	S to SW	2	N to NE	3	MM+2	MM+8	....
Kem' (177)	64 57	34 39	....	....	....	....	....	....	Rapids.
Karel'skiy Bereg (185), off	65 30	35 30	Swd	....	Nwd	....	....	....	Off the Karel'skiy Bereg the flood flows southward parallel to the coastline. The flood along the northern shores of the Ostrov Solovetskiy (120) joins this current, which continues southward into Onezhskaya Guba (132). Rips are formed where the two currents meet.
Pon'gama Guba (183)	65 21	34 35	SW	...	NE	....	....	....	Rips are formed when the ebb from Pon'gama Guba meets the ebb setting northward along the Karel'skiy Bereg (185).
Pon'gama (184)	65 21	34 24	....	....	....	....	....	....	Rapids.
Kalgalaksha Guba (186), S of entrance	65 36	34 55	....	2¼	NE to N	2¼	MM+11½	MM+5	Southward of this position the flood sets WSW and turns southward along the coast toward Kemskiye Shkhery (174).
Off entrance	65 38	35 00	WSW	....	ENE	....	....	....	....
Inside	65 42	34 50	NW	2	SE	....	....	....	The currents are so rapid between the rocks in the entrance to Kalgalaksha Guba (186) that it is dangerous for boats to enter the bay until 3 hr. after low water. Then the velocity of the current is decreased since many of the ledges are covered. There are rapids in the river. In the area of shoals and reefs the velocity is 2½ knots.
Severnyy Kemskiy Stamik (182)	65 10	35 16	SW	strong	....	....	....	....	It is reported that the flood sets strongly toward Severnyy Kemskiy Stamik from 3 to 9 hr. after the moon's meridian passage.
Ostrova Rombaki (175), vicinity	65 02	35 05	....	2½	....	3	....	....	Rips.
4 mi. ENE of	65 03.2	35 10½	(Table III - 8)		....	....	....	....	....
Between Ostrova Rombaki (175) and Ostrov Oleshin (180)	65 00	35 09	....	2½	....	2½	....	....	....

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Letneretskaya Guba (181)	65 08	34 43	SSW	....	NNE	....	....	....	....
Kemskiye Shkhery (174), vicinity	64 58	35 00	S to SW	....	N to NE	....	MM+2	MM+8	....
N and S passages between the islands	64 58	35 00	....	2½	....	....	....	....	Among these islands, the flood meets the northward ebb, causing many rips.
Gridina Guba (188)	65 56	34 42	SW	....	NE	....	....	....	....
Kandalakshskaya Guba (189)	66 30	34 00	NW	1	SE	1	....	....	Off the Karel'skiy Bereg (185) the flood sets toward the islands of Guba Keret' (195) and the outer islands off Guba Kovda (207). Along the NE shore the flood sets toward Mys Turiy (243) and Guba Zapadnaya Por'ya (228).
Mys Sharapov (190), 2¾ mi. NE of	66 16	34 09	NEwd	½	SWwd	½	MM+9¼	MM+3	....
4 mi NNW of	66 18	33 59	W	1	E	1	MM+9½	MM+3¼	....
Glubokaya Salma (192)	66 17	33 46	NW	1	SE	1	....	....	....
Bol'shaya Salma (191)	66 17½	33 46½	W	½	E	½	....	....	....
Guba Keret' (195)	66 18	33 43	Wwd	¾	ESE	1¼	MM+9¼	MM+3¼	....
Keret' (196)	66 17	33 34	....	....	....	....	....	....	Rapids. The river current in Keret' is very strong.
Bol'shaya Salma (193), ½ mi. N of E extreme of	66 18	33 42½	WNW	1	ESE	1	MM+9¼	MM+3	....
Ostrov Sredniy (194), anchorage	66 17½	33 37	....	....	NE	1¼	....	....	The flood near Ostrov Sredniy anchorage is weak because of the strong current from Keret' (198). It is also weak in the strait between the island and the mainland.
Channel S of	66 17½	33 39½	....	....	E	1¼	....	....	....
Guba Chupa (198)	66 20	33 33	Wwd	½	Ewd	....	....	....	The flood enters Guba Chupa from the NE.
Plavezhma (197)	66 15½	33 00	....	....	....	....	....	....	Rapids.
Guba Kiv (199)	66 23	33 36	W	....	E	....	....	....	....
Velikaya Salma (200)	66 29½	33 31	WNW	1¼-1½	ESE	2	MM+9	MM+2	....
Guba Kuzokotskaya (201)	66 28	33 25	SSW	2	NNE	....	....	....	....
Ostrov Olenevskiy (203), channel N of	63 31½	33 00	WNW	3	Ewd	3½	....	....	The ebb from the north entrance channel of Chernaya (204) sets strongly toward the point at the north.
Channel S of	66 30	33 00	SWwd	3	NEwd	3½	....	....	....
Chernaya (204)	66 31	32 52½	....	....	....	....	....	....	Rapids.
Guba Kislaya (202)	66 32	33 06	....	....	....	....	....	....	The flood enters Guba Kislaya from Velikaya Salma (200) and the ebb flows in the opposite direction.
Guba Rugozerskaya (205)	66 34	33 00	Wwd	3	Ewd	....	....	....	....
Bab'ye More (206), entrance	66 36	33 18	NW	....	SE	....	....	....	....
Guba Kovda (207)	66 42	32 56	W	½	E	0.7	MM+10	....	During light winds the flood sets toward the western end of Ostrov Olenevskiy (203) and the shore to the north.
Kovda (208)	66 41	32 51	S	0.3	....	....	....	....	Rapids.
Channel between Ostrov Ovechiy (209) and Ostrov Oleniy (210)	66 42½	32 53	SW	....	NE	....	....	....	....
Channel S of Ostrov Ovechiy (209)	66 41¾	32 54	E	....	....	....	....	....	....
Guba Startseva (211)	66 43	32 48	NW	....	SE	....	MM+4	....	....
Vachevskaya Salma (212)	66 46	32 53	NW	1½	SE	1½	....	....	....

Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6

Banka Vorob'yeva (224)	66 46½	33 04	....	....	....	...	....	....	There are ripples over Banka Vorob'yeva in calm weather.
Guba Knyazhaya (213), off	66 53	32 34	NW	½	SE	½	....	....	....
10 mi. E of	66 51¾	32 55	NW	1	SE	1	MM+10¼	MM+4½	....
Inside entrance	66 53	32 30	W	½	E	½	....	....	....
Guba Voron'ya (214)	66 55	32 30	NW	....	SE	....	....	....	....
Guba Kapshina (215)	66 57	32 33	NW	....	SE	....	....	....	....
Kibirinskaya Salma (223)	67 00	32 45	NW	1-2	SE	1-2	MM+10	MM+4	....
Guba Palkina (217)	67 03½	32 21	W	....	E	....	....	....	The flood enters and the ebb leaves Guba Palkina by both entrance passages.
Kandalakshskiye Shkhery (216)	67 00	32 40	NW	½-1½	SE	....	....	....	....
Kandalakshskiy Reyd (221), road	67 08	32 24½	NW	1½	SE	1½	....	....	The flood enters through Kibirinskaya Salma (223).
Guba Kanda (218)	67 07	32 18	NW	....	SE	....	....	....	....
Guba Lupcha (219)	67 09	32 23	NW	....	SE	1	....	....	....
Niva (220)	69 09	32 26	....	....	....	....	....	....	Rapids.
Guba Kolvitsa (222), entrance	67 03	32 45	NE	....	SW	1	....	....	....
Inside	67 04	32 50	ENE	....	....	....	....	....	....
Ostrova Sredniye Ludy (225), 2½ mi. ENE of	66 36	33 46	NW	½	SE	½	MM+8¾	MM+2½	....
Guba Bol'shaya Por'ya (231)	66 41	33 48	Nwd	¾-1	Swd	½-1	MM+8¼	MM+1½	The current is somewhat rotary here. Inside the bay the northward flood and southward ebb are weak.
Guba Pedunikha (226)	66 43	33 37	NW	1	SE	....	....	....	....
Guba Belozerskaya (227)	66 43½	33 39	NW	....	SE	....	....	....	The flood enters and the ebb leaves Guba Belozerskaya through the passage westward of the island at its mouth.
Guba Zapadnaya Por'ya (228), entrance	66 45½	33 37½	NW	....	SE	....	....	....	....
Inside	66 47	33 34½	NNW	....	SSE	...	....	....	....
Guba Shushpanikha (229)	66 47½	33 38	N	weak	S	weak	....	....	....
Guba Kostarikha (230)	66 47½	33 41	N	....	S	½	....	....	....
Guba Tar (232)	66 42	33 53	N	..	S	weak	....	....	....
Guba Lov (233)	66 41	34 02	N	½	S	½	....	....	....
Guba Pil'skaya (234)	66 43	34 08	....	3-3½	....	3-3½	....	....	....
Guba Padan (235)	66 40½	34 13	....	weak	....	weak	....	....	The flood sets toward the W entrance of Guba Padan and then follows the trend of the bay.
Ostrov Vol'ostrov (241), 2 mi. WNW of	66 38	34 14½	NW	1	SE	1	MM+11¾	MM+5¼	....
Guba Umba (236)	66 40	34 18	Nwd	¼	Swd	....	....	....	The ebb flows out of Guba Umba from 3 to 12 hr. after the moon's meridian passage. From 12 to 3 hr. after the moon's meridian passage the current is generally weak, sometimes ebbing and sometimes flooding.
Ust'yanskiy Ostrovok (237), narrows N of	66 39¾	34 17¾	....	...	....	1½	....	....	In the entrance to the river the current is strong. In the bay it flows toward the north side of Ust'yanskiy Ostrovok and also toward the rock close off the eastern entrance point.
¼ mi. S of	66 39	34 18	Nwd	½	Swd	½-1	MM+10½	....	....
Guba Malaya Pir'ya (238)	66 40	34 20	Nwd	very weak	Swd	very weak	....	....	....
Guba Bol'shaya Pir'ya (239)	66 39½	34 21	Nwd	....	Swd	....	....	....	As the flood approaches the narrows in Guba Bol'shaya Pir'ya, its velocity is not more than ½ knot. In the narrows it increases to 0.7, and in the wider part it is hardly perceptible. The ebb flows in the opposite direction at the same velocities.
Guba Sosnovaya (240), entrance	66 39	34 21½	NNE	½	SSW	½	....	....	....

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Entrance, 1/10 mi. NNE of Mys Chukcherskiy (242)	66 38	34 23	ENE	....	WSW	....	....	....	At the entrance to Guba Sosnovaya the flood flows toward the north side of the bay.
Inside	66 38½	34 25	E	....	....	....	....	....	....
Off entrance, ¼ mi. SW of Mys Chukcherskiy (242)	66 38	34 22½	N	½	S	½	....	....	Part of the flood off the entrance to Guba Sosnovaya (240) turns northwest into Guba Bol'shaya Pir'ya (239). The ebbs from both bays unite and pass northwestward and westward of Ostrov Vol'ostrov (241). A small part flows through the channel eastward of that island.
Mys Chukcherskiy (242), 1 mi. W of	66 38	34 20	ENE	½	WSW	½	MM+10½	MM+4½	....
Mys Turiy (243), 2¼ mi. S of Light	66 30½	34 30½	Wwd	2	Ewd	1½	MM	MM+5¾	In Kandalakashkaya Guba (189) the velocity of the flood is 1 knot except off Mys Turiy where it is 2 knots. The current off Mys Turiy is somewhat rotary.
Chernaya (244)	66 36¼	34 42½	Nwd	....	Swd	....	....	....	Both Chernaya and Kuzreka (245) are full of rapids.
Kuzreka (245)	66 36½	34 48	Nwd	....	Swd	....	....	....	do.
Khlebnaya (246)	66 36	34 53½	Nwd	....	Swd	....	....	....	....
Varzuga (247)	66 16	36 59	NW	....	SE	....	....	....	Rapids. At the entrance to Varzuga the westward current flows toward the western entrance point. Southerly winds cause a rough sea on the bar. The flood is noticeable 12 miles within the entrance, but it does not overcome the river current at this point. Pulling boats pass the rapids here with difficulty.
Off the entrance	66 14	37 00	WNW	....	ESE	....	....	....	....
Chavan'ga (248)	66 06½	37 47	....	....	S	....	....	....	Rapids.
Mys Kamennyy (250), 2 mi. SSE of	66 01½	38 21½	(Table III - 7)		....	....	....	....	....
Mys Nikodimskiy (252), 15 mi. SSW of	65 54	38 51	(Table III - 8)		....	....	....	....	....
5 mi. S of	66 02	39 06½	(Table III - 7)		....	....	....	....	....
23 mi. E of	66 08¼	40 02	(Table III - 7)		....	....	....	....	....
8½ mi. E of	66 06½	39 28½	(Table III - 7)		....	....	....	....	....
Chapoma (251)	66 06½	38 53½	....	....	....	....	....	....	Rapids.
10½ mi. SSE of	65 56	39 02	(Table III - 7)		....	....	....	....	....
Chernyavka (253)	66 09½	39 19	....	....	....	....	....	....	Rapids.
Pyalitsa (254), entrance	66 11	39 29	Nwd	weak	....	2	....	....	In Pyalitsa the flood is felt beyond the islet.
Pulonga (255)	66 15½	39 57	....	....	....	....	....	....	Rapids.
Likhodeyevka (256)	66 20	40 09½	....	....	....	....	....	....	Rapids.
E of	66 17	40 27	....	....	....	1.9	....	H+5½	Time of high water at Ostrov Sosnovets (259).
6 mi. S of	66 13.6	40 09	(Table III - 8)		....	....	....	....	....
Ostrov Sosnovets (259), off	66 25	41 04	....	....	....	2.9	H−1½	....	The flood is said to set across the Gorlo (257) from the vicinity of Ostrov Sosnovets toward Mys Intsy (88), and the ebb in the reverse direction. However, current charts based upon observations show evidence of such sets only near the beginning of the flood and ebb periods and not near the times of current strengths. Close to shore the currents set along the coast and are weaker than those in the middle of the Gorlo.
Between island and mainland	66 29½	40 38	S	2½	N	2½	L+3	H+3	The flood setting south by west makes a slight bend toward the northern end of Ostrov Sosnovets and through the road. A branch turns westward toward the mouth of Sosnovka (258). The ebb sets toward the south end of Ostrov Sosnovets. Winds affect the currents a great deal.
1½ mi. ESE of	66 28½	40 47½	(Table III - 8)		....	....	....	....	....

11½ mi. S of	66 17.4	40 42½	(Table III - 8)		....	....	....	....	....
10½ mi. ESE of	66 26.8	41 08.9	(Table III - 8)		....	....	....	....	....
Sosnovka (258)	66 30	40 35	NW	....	....	....	....	....	Near the entrance to Sosnovka (258) the currents change to flood and to ebb earlier than in Sosnovskiy Reyd.
Guba Krasnyye Ludki (260), 5 mi. off	66 36	41 01	....	....	....	2½	....	....	....
15 mi. off	66 37.8	41 19.1	(Table III - 8)		....	....	....	....	....
Guba Pustaya (261), off	66 40	41 20	....	....	....	1.9	....	H+4½	Time of high water is for Ostrov Sosnovets.
Mys Krasnyy (262), 7½ mi. E of	66 56	41 36	(Table III - 7)		....	....	....	....	....
10 mi. ESE of	66 52.7	41 43.4	(Table III - 8)		....	....	....	....	....
4 mi. SSE of	66 52.8	41 24.4	(Table III - 8)		....	....	....	....	....
5 mi. SSE of	66 51	41 20	(Table III - 7)		....	....	....	....	....
Between Ponoy (264) and Ostrov Sosnovets (259)	66 30	41 15	....	....	....	....	H−1½	H+4½	When the ebb changes to flood, the currents set away from the NW coast; when the flood changes to ebb, the currents set toward this coast during the first hour of the ebb then flow northward parallel to the coast. Winds greatly affect the durations of flood and ebb. Along the coast north of Ostrov Sosnovets the velocity of the flood increases rapidly, exceeding one knot during the first hour, increasing to over 2 knots during the second hour, and reaching the maximum of 3 knots at the middle of the period. Decrease in velocity is equally rapid in the later stages of flood. Velocity of ebb increases rapidly, attaining 0.7 to 1.2 knots during the first hour, and reaching maximum near the middle of the period. Velocity of the ebb decreases faster than it increases. Times of slack are for Ostrov Sosnovets.
Gorlo (257)	66 30	41 30	....	....	....	....	....	....	In the Gorlo the current is somewhat rotary, turning clockwise. Velocity is greater near the middle of the passage than near the ends and greater along the SE shore than along the NW shore.
Banka Litke (63), 1½ mi. S of	67 09½	42 45	(Table III - 7)		....	....	....	....	....
10 mi. NNW of	67 21	42 40	(Table III - 7)		....	....	....	....	....
Ostrov Veshnyak (266), vicinity	67 07	41 40	....	1.9	....	2.0	H−2½	H+2½	In the vicinity of Ostrov Veshnyak the flood attains its maximum velocity during the last hour of the period instead of during the middle of the flood period. The ebb attains its maximum velocity during the last hour of the period.
Anchorage in roadstead S of	67 05	41 23	....	3-4	....	3-4	....	....	....
19 mi. ENE of	67 12	42 11	(Table III - 7)		....	....	....	....	....
21 mi. E of	67 06	42 19	(Table III - 7)		....	....	....	....	....
11 mi. E of	67 05½	41 52	(Table III - 7)		....	....	....	....	....
2½ mi. SE of	67 04½	41 27	(Table III - 7)		....	....	....	....	....
Central channel, Mys Orlov Terskiy Tolstyy (268)	67 13	42 25	....	....	....	2.4	H−3½	H+2	The deep channel narrows off Mys Orlov Terskiy Tolstyy thus causing currents to be stronger here than elsewhere in the western channel. A velocity of 8 knots has been reported. Times given are of high water at Ostrov Sosnovets (259).
Ostrov Morzhovets (82), shoals N of	67 00	42 30	Swd	strong	Nwd	strong	....	....	....
Ponoy (264)	66 58	41 21	....	....	....	....	....	....	The flood setting southward along the coast forms strong rips when it meets the rather strong current of Ponoy. The flood, overcoming the river current, enters the river and flows upstream at a velocity of 2 knots. The effect of the flood is felt as far up the river as the first rapids. A heavy sea is caused off the mouth of Ponoy (264) by the river ebb crossing the northward coastal ebb current. These together set small boats onto Ostrova Ponoyskye Ludki (263) at times. The ebb velocity in the river sometimes exceeds 3 knots during the spring months.
Ostrova Ponoyskye Ludki (263), 12 mi. E of	67 00	41 53.7	(Table III - 8)		....	....	....	....	....
3 mi. E of	66 59½	41 30.4	(Table III - 8)		....	....	....	....	....
Guba Bakalda (265)	67 05½	41 21	....	....	....	....	....	....	In winter the currents form ice hummocks in Guba Bakalda.

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location Lat. N	Location Long. E	Flood strength Direction (true)	Flood strength Velocity (knots)	Ebb strength Direction (true)	Ebb strength Velocity (knots)	Time of slack Before flood	Time of slack Before ebb	Remarks
	° ′	° ′							
Tri Ostrova (267)	67 06½	41 22	S	3-4	N	3-4	H—3½	H+1½	The flood enters through the north entrance of the strait between Tri Ostrova (267) and the mainland. At the north end of this strait the currents set strongly across the channel. Times given are of high water at Ostrov Sosnovets (259).
Mys Orlov Terskiy Tolstyy (268), western channel, off	67 10	41 35	Swd	4½-6½	Nwd	4½-6½	....	....	A velocity of 8 knots is said to have been experienced in the western channel. Velocities of flood and ebb are greater along the mainland and along the shoals than in the center of the channel. The velocity during the flood period generally decreases at the end of the period more slowly than it increases at the beginning of the period. However, in some places, as the first 10 miles S of Mys Orlov Terskiy Tolstyy, it decreases very rapidly. Toward the end of the ebb period the velocity decreases rapidly. Within one hour the decrease is as much as a knot at some places.
3½ mi. 69° from	67 13	41 28	....	....	....	2.8	....	....	....
12 mi. NE of	67 20	41 43	(Table III - 7)		....	....	....	....	It has been stated that the velocity off Mys Orlov Terskiy Tolstyy reaches 8 knots.
8½ mi. NE of	67 18.2	41 37.8	(Table III - 8)		....	....	....	....	....
6½ mi. NE of	67 16	41 32	(Table III - 7)		....	....	....	....	....
17 mi. NE of	67 22	42 00	....	....	....	2½	H—4½	H+1½	Time of high water at Ostrov Sosnovets (259).
Guba Gogolina (269)	67 12½	41 14	....	....	....	....	....	....	The eddy setting northeastward from the southeastern part of Guba Gogolina during flood causes a rough sea off Mys Orlov Terskiy Tolstyy.
Mys Kachkovskiy (270), 12 mi. E of	67 27	41 36	(Table III - 7)		....	....	....	....	....
About 25 mi. E of	67 26	42 15	....	....	....	....	H—4½	H+1½	Time of high water at Ostrov Sosnovets (259).
4 mi. E of	67 26.8	41 18	(Table III - 8)		....	....	....	....	The flood passing round the large bend in the coast N of Mys Kachkovskiy sets nearly at right angles into the main stream of the flood off Mys Kachkovskiy. This causes overfalls and a turbulent sea.
7 mi. ESE of	67 24	41 22	(Table III - 7)		....	....	....	....	....
Banka Malaya Panfilovaya (271), 7½ mi. SE of	67 30	42 39	(Table III - 7)		....	....	....	....	....
13 mi. NE of	67 42	42 53	(Table III - 7)		....	....	....	....	....
7 mi. N of	67 42½	42 29	(Table III - 7)		....	....	....	....	....
20 mi. N of	67 55	42 23	(Table III - 8)		....	....	....	....	....
11 mi. SW of	67 28½	42 00	(Table III - 7)		....	....	....	....	....
Zaliv Kachkovskiy (272), 5 mi. ENE of	67 33	41 12	(Table III - 7)		....	....	....	....	....
Mys Bol'shoy Gorodetskiy (274), off	67 50	42 10	....	....	....	....	H—4½	....	Time of high water at Ostrov Sosnovets (259).
4 mi. E of	67 43	41 05	(Table III - 7)		....	....	....	....	....
1 mi. E of	67 41	41 02	(Table III - 8)		....	....	....	....	....
Guba Turna (275)	67 44	40 49	....	....	....	....	....	....	During the flood there are cross currents and eddies in Guba Turna.
Zaliv Lumbovskiy (276), entrances	67 50	40 34	....	....	....	....	....	....	The flood enters Zaliv Lumbovskiy through both entrance passages, meeting on the southern side of the island. The ebb sets out of both passages and joins the northwestward ebb about ½ mile from shore. There are strong currents over the shoals around the island.
Mys Krestovoy (278), 7¼ mi. E of	67 54.8	40 39.3	(Table III - 8)		....	....	....	....	....
Zaliv Lumbovskiy (276), off	68 00	42 00	....	....	....	....	H—5½	H+1	Time of high water at Ostrov Sosnovets (259).
Banka Moriston (277), vicinity	67 56	40 26	....	....	....	....	....	....	Strong rips.

Guba Startseva (279)	67 56	40 10½	....	....	....	....	....	....	Flood sets toward the reef on eastern side of Guba Startseva, then turns southward into the arms of the bay.
Guba Korov'ya (280)	67 59	40 02	....	....	....	....	....	....	Flood sets into Guba Korov'ya and, as it eddies out along the southern shore, it meets the flood along the coast forming strong rips off the south headland.
Between Mys Svyaty Nos (281) and Ponoy (264)	68 11 to 66 58	39 53 to 41 23	....	....	....	....	....	....	In the area between Mys Svyaty Nos and Ponoy the current is rotary, turning clockwise. During the change from flood to ebb the current sets toward the shore, and during the change from ebb to flood away from the shore. At the beginning of the flood the velocity increases rapidly, attaining one knot or more during the first hour. During the following hours the rate of increase is much slower, the maximum velocity being attained during the middle of the period. The maximum velocity lasts from 1 to 2 hr. The velocity of the ebb stream increases rapidly. During the first hr. of the ebb the velocity reaches 1 or 2 knots. During the following hours the velocity of the ebb increases gradually attaining its maximum toward the middle of the period or slightly later. Northerly winds increase the velocity and duration of the flood and decrease the ebb. Southerly winds increase the ebb and decrease the flood.
Between Mys Svyatoy Nos (281) and Mys Bol'shoy Gorodetskiy (274)	68 11 to 67 45	39 53 to 41 00	SE	2½	NW	....	....	....	The flood in the offing between Mys Svyatoy Nos and Mys Bol'shoy Gorodetskiy sets toward Zaliv Lumbovskiy (276) and Mys Bol'shoy Gorodetskiy. The ebb sets toward the bank on the northeastern side of Mys Svyatoy Nos (281) flowing parallel to the coast.
Mys Svyatoy Nos (281), off	68 25	41 20	SE	2½	NW	....	H−5½	H+½	Time of slack is at Ostrov Sosnovets (259).
Near shore	68 11	39 45	....	4½	....	4½	....	....	Heavy tide rips extend 6½ miles from Mys Svyatoy Nos (281), between northeastward and eastward from it during flood and about northward during ebb. With easterly winds the sea here is high, short, and dangerous.
40½ mi. ENE of	68 24	41 27	(Table III - 8)		....	....	....	....	....
4 mi. NE of Lt.	68 11	39 54	(Table III - 8)		....	....	....	....	....
6¼ mi. NE of Lt.	68 12	40 00	(Table III - 8)		....	....	....	....	....
3 mi. N of	68 13	39 45	....	2½	....	2½	MM+4	MM+10	About 3 miles north of Mys Svyatoy Nos the flood flows southeastward at 2½ knots and then south-southeastward at 2 knots. For a short time before the change the current is weak. The ebb flows west-northwest, then northwest at 1½ knots and north-northwest for a short time at 2½ knots. After this it becomes weaker.
						Murmanskiy	*Bereg (311)*		
Along the coast	69 20	36 00	Ewd	....	Wwd	....	H−5¼	H+¾	Along the Murmanskiy Bereg the velocity and direction of the current and the durations of flood and ebb are much influenced by the wind.
Svyatonosskiy Zaliv (282), center	68 07	39 37	ESE	....	WNW	....	....	....	....
Off the E shore of	68 05	39 48	....	....	....	....	....	....	Off the east shore of Svyatonosskiy Zaliv the water always flows from south to north.
Off the W shore	68 07	39 26	SE	1½-2	NW	1½-2	....	....	....
Iokan'ga (283), 3½ mi. upstream	67 59½	39 43½	....	....	....	....	....	....	Rapids. Near the mouth of Iokan'ga the flood is imperceptible because of the constant river current.
Ostrov Medvezhiy (285), strait of	68 03	39 35	SE	1	....	....	MM+3½	....	....
Ostrov Vitte (287), narrows off	68 05	39 27½	SE	2½	....	....	MM+3½	....	....
Between Mys Svyatoy Nos (281) and Semiostrovskiy Reyd (297)	68 09 to 68 48	39 46 to 37 26	SE	....	NW	....	....	....	The current between Mys Svyatoy Nos and Semiostrovskiy Reyd usually flows southeast and northwest, but 2 or more miles offshore it is somewhat rotary, turning clockwise. During the change of current tide rips may be seen near the coast, especially off Mys Svyatoy Nos. Farther out they are imperceptible, probably the currents are weak near the times of change.
Mys Klytany (288), off	68 12	39 08	SE	2	NW	2	H−4	H+2	The flood has a velocity of 1½ knots between the rocks eastward of Mys Klytany and ¾ knot through the passages into the bay.
Mys Chernyy (290), 4 mi. NNE of	68 26	38 43½	(Table III - 7)		....	....	....	....	The tidal currents tend to set toward Mys Chernyy.
Zaliv Vostochnyy Nokuyevskiy (291), outer part	68 22	38 33	S	1½	N	1½	....	....	In the inner part of Zaliv Vostochnyy Nokuyevskiy the currents follow the directions of the shores.

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Ivanovka (292), entrance	68 19	38 35½	....	....	....	....	....	....	Rapids.
Ostrov Kitay (294), passage S of	68 24½	38 20½	Wwd	¾	Ewd	¾	....	....	The northwestward ebb sets toward Ostrov Kitay. After the bank which is northwestward of Ostrov Kitay is covered, the flood sets southward through the passage west of the island.
Guba Dvorovaya (295), entrance	68 27	38 13½	S	½	....	....	....	....	....
Vostochnaya Litsa (296), entrance	68 38¼	37 48	SW	¼-½	NE	2	....	....	Rapids begin one mile upstream from Vostochnaya Litsa entrance.
Ostrov Kharlov (298), 6½ mi. ENE of	68 51½	37 38	(Table III - 7)		....	....	....	....	....
Semiostrovskiy Reyd (297)	68 47	37 24	SE	2½	NW	2½	MM+2½	MM+8½	There are rips and eddies near the islands along Semiostrovskiy Reyd.
Mys Zapadnyy (302), ½ mi. E of	69 03.6	36 21.3	(Table III - 8)		....	....	....	....	....
Zakhrebetnoye (301)	69 02.2	36 25	Ewd	1½	NWwd	1½	....	....	....
Guba Zelentskaya (304)	69 07½	35 06	....	....	....	....	....	....	During northeasterly winds a heavy sea comes into the eastern channel. In this channel the flow is toward the eastern shore of the bay.
Ostrov Bol'shoy Gavrilovskiy (306), 1¼ mi. N of NW extreme	69 12	35 54.8	(Table III - 8)		....	....	....	....	....
Samoed Channel (307)	69 11½	35 49	SE	....	....	....	....	....	When the southeastward current is deflected off Guba Voron'ya, a rough sea is caused.
Voron'ya (308)	69 11	35 48½	....	....	....	....	....	....	Rapids.
Guba Teriberskaya (309), outer part	69 14	35 08	SEwd	....	....	....	....	....	....
Inner bay	69 11	35 09	S	very weak	....	....	....	....	....
Up the river	69 10	35 08	....	....	....	1½	....	....	The flood is scarcely felt one mile up the river.
Kil'dinskiy Proliv (313) anchorage in bight in E end of	69 19½	34 19	....	....	....	....	....	....	In the anchorage in the bight in the eastern end of Kil'dinskiy Proliv there are no tidal currents.
Narrow part of	69 18½	34 09½	(Table III-8)		....	3-5	H+1	....	....
Middle of W entrance	69 19½	33 58	Ewd	½	NWwd	1	H+6½	....	....
Ostrov Kil'din (314), 5 mi. NW of	69 27	33 54	SE	2	NW	2	....	....	....
Mys Byk (315), 2½ mi. W	69 21	33 51½	SE	2	NW	1½	....	....	....
5½ mi. NNW of	69 25½	33 51	SE	2	NW	1½	MM+2	MM+8¼	....
Guba Dolgaya Zapadnaya (315), entrance	69 17½	33 49½	Swd	¾	Nwd	....	H−5½	H+½	....
Guba Zelenetskaya Zapadnaya (317), entrance	69 18	33 46	....	....	....	....	H−5½	H+½	The flood off Guba Zelenetskaya Zapadnaya flows southward toward the entrance shore. In the entrance the velocity is ¾ knot between the islets and about ½ knot eastward of them.
Kol'skiy Zaliv (340), off Mys Set'-Navolok (342)	69 24½	33 31	....	....	....	....	....	....	With a strong northeasterly wind and swell the southeastward flow sets strongly onto Mys Set'-Navolok and causes a choppy sea.
Mys Letinskiy (318), 3 mi. N of	69 21	33 36	....	....	....	....	....	....	Off the entrance to Kol'skiy Zaliv (340) about 3 miles northward of Mys Letinskiy the flow has been observed to be constantly northeastward, with a velocity of ¾ knot and over.
Mys Lodeynyy (341), 1¼ mi. SE of	69 21.1	33 31.2	S	...	N	....	MM+2	MM+8¼	....

Osov Toros (339)	69 18½	33 26½	....	....	....	....	H+6	....	The flood flows into the strait west of Ostrov Toros through both entrances. It flows southward through the north entrance and northward through the southern one until the banks between the mainland and Ostrov Toros (339) are covered. Then the flood flows southward with a velocity of one knot. The ebb flows northward through this strait with a velocity of 1½ knots until the bank dries.
Guba Sayda (338), entrance	69 16½	33 22	SW	1½	NE	....	H+6½	H	....
Guba Pala (336), entrance channel	69 13	33 25¼	....	¾	....	¾	....	....	....
Yekaterininskaya Gavan' (335), harbor entrance	69 13	33 26½	SW	¾	....	½	H−6	....	....
Inside	69 12¾	33 27	SE	½	....	....	....	....	The water rises equally on both sides of the ridge south of Yekaterininskaya Gavan' until 4½ hr. before high water when the ridge covers. After this the flood enters from the east with a velocity of about ¼ knot. The currents from both entrances meet about half way up the harbor. There is practically no current from ½ hr. before to ½ hr. after high water. The ebb flows from the middle out both entrances until the bank at the head uncovers.
Mys Ignatyeva (334), 1 mi. E of	69 13	33 32	(Table III - 8)		....	....	....	....	....
Guba Srednyaya (320), entrance	69 09	33 34	S	1½	N	2	....	....	....
Guba Pit'kova (333)	69 08½	33 25½	....	weak	....	weak	....	....	....
Ostrov Sal'nyy (321), ½ mi. WNW of	69 08	33 26	(Table III - 8)		....	....	....	....	....
Guba Vayenga (322)	69 05½	33 26½	S to SE	....	N to NW	....	....	....	The southward or southeastward flood turns eastward when it reaches the 4-ft. shoal in Guba Vayenga.
Mys Velikiy (332), in fairway off	69 05	33 16	(Table III - 8)		....	....	....	....	....
Guba Gryaznaya (323), in fairway off	69 04½	33 16½	(Table III - 8)		....	....	....	....	....
Mys Mishukov (331), anchorage ½ mi. S of	69 02½	33 02½	....	weak	....	weak	....	....	....
Mys Bazisnyy (324), in fairway off	69 01½	33 03	(Table III - 8)		....	....	....	....	....
Murmansk (325), off mooring	68 59	33 03	(Table III - 8)		....	....	....	....	....
Mys Khaldeyev (330), ½ mi. WSW of	68 58	33 02	(Table III - 8)		....	....	....	....	....
Mys Lagernyy (329), off	68 56½	33 01	(Table III - 8)		....	....	....	....	....
Mys Drovyanoy (328), in fairway off	68 56	33 01½	(Table III - 8)		....	....	....	....	....
Mys Klev-Navolok (327), 1/10 mi. S of	68 53	33 00	(Table III - 8)		....	....	....	....	The northward flow may attain a velocity of 8 knots off Kola (326) during the freshets. There are rapids in the river 7 miles above Kola.
Mys Pogan'-Navolok (343), 2½ mi. NNE of	69 28	33 28	SE	2	NW	....	MM+1½	MM+7¾	With a strong northeasterly wind and swell the southeastward flow sets strongly toward Mys Pogan' Navolok and causes a choppy sea.
Guba Korelinskaya (344)	69 25½	33 22½	SE	1¼	....	....	....	....	....
Mys Voriy (345), off	69 27	33 22	SE	½	....	....	....	....	Off Mys Voriy the currents meet, causing a cross sea.
Guba Ura (346), off entrance	69 29	33 15	SE to SSE	....	....	....	MM+1½	MM+7	....
Port-Vladimir (347)	69 25	33 08½	....	....	....	....	....	....	A tidal bore has been observed at Port-Vladimir.
Narrows near Ostrovok Mogil'nyy (348)	69 23	33 04½	SW	1½	....	....	....	....	....
Guba Kislaia (349), narrows of	69 22½	33 05	Swd	3	....	....	....	....	....

TABLE III - 6 (Continued)

Place and ref. No. (Figs. III - 51 to III - 53)	Location		Flood strength		Ebb strength		Time of slack		Remarks
	Lat. N	Long. E	Direction (true)	Velocity (knots)	Direction (true)	Velocity (knots)	Before flood	Before ebb	
	° ′	° ′							
Guba Kislaia (349)									
Wider part	69 22	33 04½	Swd	¾	....	....	....	....	....
Ostrov Shalim (350), S of	69 23	33 03	SW	½	....	....	....	....	....
2 mi. NE of N tip	69 27½	33 14	....	....	W to NW	....	...	....	....
Motovskiy Zaliv (352)	69 32	32 40	....	2	....	2	....	....	The flood sets into Motovskiy Zaliv along the northern side and out along the southern side of the gulf.
S entrance, 1 mi. N of	69 28	33 04	SE	....	NW	....	MM+2	MM+9¼	....
S entrance, E of	69 28	33 07	....	....	NW	1-1½	....	....	....
Guba Ara (354)	69 28	32 56	S	....	N	....	MM+1	....	....
Ostrov Bol'shoy Arskiy (353), channel W of	69 27½	32 55	S	2	N	....	....	....	....
E side of	69 27½	32 57½	SW	1½	NE	....	....	....	....
Guba Vichany (355), entrance	69 29	32 37	....	....	....	....	....	....	The currents form rapids in the entrance to Guba Vichany.
Guba Yeyna (361), 1¼ mi. SSW of W entrance point	69 36.9	32 23.2	WNW	....	ESE	....	MM+2½	MM+7¾	....
Mys Sharapov (364), 1¼ mi. S of	69 33.9	32 57.8	SW	....	NE	....	MM+2	MM+8¼	....
Mys Bashenka (365), vicinity	69 38½	33 09	....	2	....	2	....	....	....
Mys Tsyp-Navolok (367), off	69 42½	33 12	S to SW	1¼	....	....	MM+2	MM+8	....
5 mi. E of	69 43	33 22	SEwd	....	....	....	MM+1	....	
3½ mi. N of	69 46½	33 07	SE	....	NW	....	MM+1	MM+7¼	
Mys Kekurskiy (369), 6 mi. N of	70 02.7	32 04½	....	....	....	....	....	....	
Guba Vayda (370)	69 56½	32 01	SW	....	....	....	....	....	The flood in Guba Vayda has some strength along the eastern shore, but is very weak along the western one.
Entrance, off	69 58	32 03	SE	1½	WNW to NW	....	MM+½	MM+7	....

TABLE III - 7

ROTARY TIDAL CURRENTS — EUROPEAN U.S.S.R., NORTH COASTAL SECTOR
Times are in lunar hours after the moon's meridian passage. (local)
Velocities are in knots. Directions are in degrees measured clockwise from true north.

Location	Units	1	2	3	4	5	6	7	8	9	10	11	12
Mys Bol'shoy Gorodetskiy (274)													
4 mi E of	Degs	..	..	..	..	..	..	..	SE	SE-S	SE-S	SE-S	S
67°43'N, 41°05'E	Kns	..	..	..	..	..	..	..	3	3–1½	3–1½	3–1½	1½
Banka Malaya Panfilovaya (271)													
7 mi N of	Degs	..	315	340	..	..	355	70	130	150	..	195	275
67°42½'N, 42°29'E	Kns	..	3	4	..	..	2	1½	3	3	..	1	½
13 mi NE of	Degs	..	340	..	..	25	75	120	140	160	..	205	278
67°42'N, 42°53'E	Kns	..	3	..	..	2	½	2	2	2½	..	2	1
Zaliv Kachkovskiy (272), entrance													
5 mi ENE of	Degs	*255	305	330	0	..	40	70	125	160	170	..	200
67°33'N, 41°12'E	Kns	1	2½	2½	3	..	2½	1½	2½	2½	2½	..	1½
Banka Malaya Panfilovaya (271)													
7½ mi SE of	Degs	..	185	270	320	345	..	0	90	135	165	..	..
67°30'N, 42°39'E	Kns	..	3	½	2	4	..	3	under ½	1½	3½	..	..
11 mi SW of	Degs	*325	..	345	..	..	10	..	135	..	165	..	225
67°28½'N, 42°00'E	Kns	2½	..	3½	..	..	2	..	2½	..	2½	..	..
Mys Kachkovskiy (270)													
12 mi E of	Degs	290	340	5	..	..	..	25	90	135	155	180	222
67°27'N, 41°36'E	Kns	1	3	3½	..	..	..	1	½	½	1½	3	2
7 mi ESE of	Degs	*315	340	..	0	..	20	30	130	..	155	170	200
67°24'N, 41°22'E	Kns	1	3	..	4½	..	2	1	2	..	3	4	1
Banka Litke (63)													
10 mi NNW of	Degs	*250	295	315	335	..	0	70	115	135	155	..	180
67°21'N, 42°40'E	Kns	1½	2	3	3½	..	2½	1	2½	2½	3	..	1
Mys Orlov Terskiy Tolstyy (268)													
12 mi NE of	Degs	*255	320	..	350	..	35	75	140	..	170	..	200
67°20'N, 41°43'E	Kns	1	2	..	3½	..	2½	1	1½	..	2	..	1½
6½ mi NE of	Degs	..	*295	345	..	..	5	50	100	140	175	..	195
67°16'N, 41°32'E	Kns	..	1	4	..	..	2½	1½	1½	2½	2	..	1½
Ostrov Veshnyak (266)													
11 mi E of	Degs	190	225	270	315	..	340	5	45	90	135	155	170
67°05½'N, 41°52'E	Kns	1½	1	under ½	2½	..	2	1	½	under ½	2	2½	1
2½ mi SE of	Degs	*215	275	320	340	0	25	95	165	195	..	..	..
67°04½'N, 41°27'E	Kns	1½	½	2½	3	2½	1½	½	3	3½	..	..	..
Mys Krasnyy (262)													
7½ mi E of	Degs	*205	225	250	..	315	340	15	75	135	..	..	..
66°56'N, 41°36'E	Kns	2	3½	under ½	..	3	3	1½	1	1½	..	..	..
5 mi SSE of	Degs	..	*250	270	310	..	355	40	90	135	180	..	225
66°51'N, 41°20'E	Kns	..	2	1½	1½	..	2	1½	½	1½	2½	..	2½
Ostrov Veshnyak (266)													
19 mi ENE of	Degs	..	*205	250	295	320	..	..	340	50	115	135	160
67°12'N, 42°11'E	Kns	..	1½	½	2	3	..	..	1½	½	1½	2½	2
21 mi E of	Degs	..	215	..	320	320	..	5	45	90	135	160	..
67°06'N, 42°19'E	Kns	..	1½	..	3	2	..	1	½	2	3	2½	..
Banka Litke (63)													
1½ mi S of	Degs	..	*320	..	..	..	345	5	135	..	..	..	..
67°09½'N, 42°45'E	Kns	..	3	..	..	..	1	1	3	..	..	..	..
Mys Nikodimskiy (252)													
23 mi E of	Degs	..	..	270	45	..	..	..	..	..	90	230	..
66°08¼'N, 40°02'E	Kns	..	..	1	3½	..	..	..	..	..	1	2½	..
8½ mi E of	Degs	..	..	265	..	30	70	..	..	80	..	250	..
66°06½'N, 39°28½'E	Kns	..	..	2	..	2	2	..	..	2½	..	2	..
5 mi S of	Degs	..	..	295	..	70	..	..	..	..	115	255	..
66°02'N, 39°06½'E	Kns	..	..	1½	..	2½	..	..	..	..	1½	2½	..
Chapoma (251)													
10½ mi SSE of	Degs	..	..	..	290	345	45	..	80	..	90	..	..
65°56'N, 39°02'E	Kns	..	..	..	1½	1	1½	..	1½	..	½	..	..
Mys Kamennyy (250)													
2 mi SSE of	Degs	270	285	..	..	70	110	..	..	..	..	255	..
66°01½'N, 38°21½'E	Kns	1	2	..	..	under ½	2	..	..	..	..	½	..
Mys Intsy (88)													
5 mi N of	Degs	..	..	15	40	65	..	130	..	..	..	..	..
66°04'N, 40°43'E	Kns	..	..	1½	1½	3½	..	1½	..	..	..	..	..

* Velocity and direction ¼ hour after the hour indicated.

TABLE III - 7 (Continued)

Location	Units	1	2	3	4	5	6	7	8	9	10	11	12
Tova (90)													
10 mi W of	Degs	235	..	..	..	250	305	45	..	..	80	..	..
65°46′N, 40°04′E	Kns	1½	..	..	..	½	½	½	..	..	½	..	..
Mys Kerets (95)													
5½ mi W of	Degs	235	..	300	20	..	..	..	..	..	125	..	180
65°20½′N, 39°30′E	Kns	½	..	½	½	..	..	..	..	..	½	..	½
12 mi W of	Degs	..	210	..	230	295	..	..	..	340	40	..	155
65°20′N, 39°15′E	Kns	..	½	..	1	½	..	..	..	½	1	..	½
5 mi S of	Degs	*205	..	300	340	..	..	..	20	110	150	..	..
65°15′N, 39°41½′E	Kns	½	..	½	½	..	..	..	½	½	½	..	..
Mys Chernyy (290)	Degs	..	..	115	135	160	..	..	..	315	..	..	335
4 mi NNE of	Kns	..	..	2½	5	4½	..	..	..	2½	..	..	5
Ostrov Kharlov (298)													
6½ mi ENE of	Degs	310	310	135	..	155	155	155	155	290	310	310	310
68°51½′N, 37°38′E	Kns	2	2	1½	..	2	2	2	2	½	2	2	2

* Velocity and direction ¼ hour after the hour indicated.

TABLE III - 8

ROTARY TIDAL CURRENTS—EUROPEAN U.S.S.R., NORTH COASTAL SECTOR

Times are in solar hours before (—) or after (+) high water at Yekaterininskaya Gavan′ (E) (335) or Kem′ (K) (176). Velocities are in knots. Directions are in degrees measured clockwise from true north.

Sp — Springs, Np — Neaps, Mn — Mean

Location	HW referred to	Units	—6	—5	—4	—3	—2	—1	HW	+1	+2	+3	+4	+5	+6
Mys Kanin Nos (55)	(E)	Degs	359	354	354	353	6	167	171	170	174	195	306	359	359
3½ mi WSW of		Kns	1.0	1.1	1.0	0.8	0.1	0.7	1.3	1.4	1.1	0.5	0.2	0.6	0.9
68°39.5′N, 43°12.5′E															
15½ mi WSW of	(E)	Degs	270	283	320	336	356	33	82	121	147	158	173	209	255
68°33′N, 44°40′E		Kns	0.6	0.8	1.0	1.0	0.9	0.7	0.8	1.0	1.1	1.0	0.8	0.6	0.6
Bol′shaya Bugryanitsa (57)	(E)	Degs	326	346	354	356	1	17	34	165	171	176	184	203	308
5 mi SSW of		Kns	0.2	0.4	0.6	0.6	0.4	0.1	0.2	0.5	0.6	0.6	0.4	0.2	0.1
68°09.5′N, 44°09′E															
Kiya (59)	(E)	Degs	328	353	00	1	359	00	152	165	173	178	183	200	300
6½ mi WNW of		Kns	0.4	0.9	1.1	0.8	0.6	0.3	0.2	0.8	1.0	1.0	0.8	0.4	0.2
67°41′N, 43°53′E															
Mys Konushin (61)	(E)	Degs	333	345	345	343	347	89	132	154	163	166	168	181	306
12 mi NW of		Kns	0.6	1.4	1.6	1.5	1.1	0.5	0.4	1.1	1.5	1.6	1.4	0.8	0.3
67°22.2′N, 43°34′E															
16½ mi WSW of	(E)	Degs	..	341	334	340	347	17	149	156	164	170	175	197	291
67°05.5′N, 43°08.5′E	(np)	Kns	..	2.3	2.3	2.5	1.6	0.7	0.8	2.2	2.9	2.8	2.0	1.3	1.1
14 mi WSW of	(E)	Degs	..	323	321	318	322	318	..	154	152	155	153	162	308
67°05′N, 43°15′E	(sp)	Kns	..	3.5	3.5	3.0	2.5	1.5	0.0	3.1	3.8	3.7	2.7	1.4	1.8
11½ mi SW of	(E)	Degs	289	334	342	339	341	0	89	140	156	161	162	181	256
67°04.8′N, 43°26′E		Kns	0.9	1.6	2.3	2.3	2.0	1.2	0.8	1.4	2.2	2.5	1.9	1.2	0.6
Mys Abramov (79)	(E)	Degs	290	300	305	310	318	29	101	116	131	119	120	190	286
9½ mi NNW of	(sp)	Kns	1.5	1.8	1.5	1.2	0.8	0.3	1.0	1.6	1.7	1.5	1.0	0.3	1.1
66°32.7′N, 43°06.5′E	(np)	Kns	0.8	1.0	0.8	0.7	0.4	0.2	0.6	0.9	1.0	0.8	0.6	0.2	0.6
Ostrov Morzhovets (82)	(E)	Degs	267	290	290	320	353	40	71	101	123	140	162	203	253
6 mi W of W Lt.		Kns	1.5	1.8	1.7	1.3	0.9	1.0	1.5	1.7	1.7	1.4	1.1	1.0	1.3
66°44.7′N, 42°16′E															
16 mi NNE of Lt. at S end of	(E)	Degs	..	307	316	316	318	329	..	145	142	140	140	169	..
66°57.5′N, 42°49′E	(np)	Kns	..	1.4	2.4	2.7	2.2	1.1	0.0	1.0	2.6	2.8	2.1	1.1	0.0
Mys Intsy (88)	(E)	Degs	226	229	245	42	45	51	51	52	52	282	237	232	228
4 mi NNW of	(sp)	Kns	3.3	2.4	1.1	0.2	2.0	2.7	3.2	3.0	1.8	0.3	1.4	3.0	3.5
66°02.7′N, 40°45.2′E	(np)	Kns	1.9	1.3	0.6	0.1	1.1	1.5	1.8	1.7	1.0	0.1	0.6	1.7	1.9
22 mi W of	(E)	Degs	230	237	238	238	47	47	56	58	52	75	166	231	229
65°58.2′N, 39°54.2′E	(sp)	Kns	2.7	2.3	1.5	0.5	1.1	2.2	2.5	2.2	1.7	0.4	0.5	2.0	2.6
	(np)	Kns	1.5	1.3	0.9	0.3	0.6	1.3	1.4	1.3	1.0	0.2	0.3	1.1	1.4
Mys Veprevskiy	(E)	Degs	221	220	220	225	270	33	42	42	38	40	27	258	217
5 mi NW of	(sp)	Kns	1.3	1.2	1.2	0.7	0.1	0.6	0.9	1.2	1.2	0.8	0.6	0.4	1.2
65°40.1′N, 39°46.3′E	(np)	Kns	0.7	0.7	0.6	0.4	0.1	0.4	0.5	0.7	0.7	0.4	0.2	0.2	0.7
18 mi W of	(E)	Degs	215	222	227	243	324	16	30	39	48	60	108	183	213
65°39.6′N, 39°12.6′E		Kns	1.1	1.2	1.1	0.7	0.3	0.6	0.9	1.2	1.1	0.7	0.4	0.6	0.9
Mys Kerets (95)	(E)	Degs	163	165	172	249	315	332	341	348	354	135	145	152	157
7 mi WSW of	(sp)	Kns	0.5	0.5	0.2	0.1	0.4	0.6	0.6	0.5	0.3	0.1	0.3	0.6	0.5
65°16.8′N, 39°31.8′E	(np)	Kns	0.3	0.3	0.1	0.0	0.2	0.3	0.3	0.3	0.2	0.1	0.2	0.3	0.3
Mys Letniy Orlov (131)	(K)	Degs	41	48	51	73	198	210	212	217	230	260	343	19	36
5 mi WNW of	(sp)	Kns	3.3	3.2	2.1	0.7	1.2	2.6	3.1	2.8	2.0	1.2	1.0	2.0	3.0
64°57.8′N, 36°15.7′E	(np)	Kns	1.7	1.7	1.1	0.4	0.6	1.4	1.6	1.5	1.1	0.6	0.5	1.1	1.6

TABLE III - 8 (Continued)

Location	HW referred to		Units	−6	−5	−4	−3	−2	−1	HW	+1	+2	+3	+4	+5	+6
5½ mi NW of	(K)	(sp)	Degs	..	51	58	52	208	208	206	209	217	236	8	31	43
64°58′N, 36°18′E		(sp)	Kns	..	2.4	1.5	0.6	1.2	2.0	2.4	2.1	1.4	0.8	0.8	1.8	2.8
		(np)	Degs	..	50	49	69	142	201	207	217	236	305	7	20	35
		(np)	Kns	..	3.0	2.4	1.3	1.0	1.5	1.7	1.6	1.1	0.7	1.0	1.8	2.4
Ostrova Rombaki (175)	(K)		Degs	347	350	347	342	150	153	158	163	173	186	304	334	344
4 mi ENE of		(sp)	Kns	1.4	1.5	0.8	0.3	0.3	0.9	1.3	1.5	1.0	0.5	0.2	0.8	1.2
65°03.2′N, 35°10.5′E		(np)	Kns	0.7	0.8	0.4	0.1	0.2	0.5	0.7	0.8	0.5	0.3	0.1	0.4	0.6
Mys Tonkiy (134)	(K)		Degs	..	349	..	191	186	203	225	264	313	340	346	350	349
2½ mi SSW of		(mn)	Kns	..	0.5	0.0	0.3	0.7	0.7	0.5	0.2	0.6	0.8	1.0	0.9	0.9
64°47′N, 36°27′E																
Ostrov Bol'shoy Zhuzhmuy (161)	(K)		Degs	333	336	336	339	106	142	150	153	154	170	284	321	330
10½ mi ENE of		(sp)	Kns	1.1	1.1	0.9	0.5	0.2	0.7	1.1	1.3	0.9	0.4	0.2	0.6	0.9
64°44′N, 35°56.7′E		(np)	Kns	0.6	0.6	0.5	0.2	0.1	0.4	0.6	0.7	0.5	0.2	0.1	0.3	0.5
Mys Chesmenskiy (135)	(K)		Degs	256	253	258	297	56	63	70	76	90	116	194	252	259
2½ mi SE of		(sp)	Kns	0.8	0.7	0.5	0.1	0.4	0.7	0.7	0.5	0.3	0.2	0.1	0.4	0.7
64°41′N, 36°36′E		(np)	Kns	0.4	0.4	0.3	0.0	0.2	0.4	0.4	0.3	0.2	0.1	0.1	0.2	0.4
Lyamtsy (137)	(K)		Degs	319	327	329	329	337	139	133	133	133	152	185	290	312
6½ mi SSW of		(sp)	Kns	1.9	2.0	1.5	0.9	0.2	0.6	1.3	2.0	2.1	1.5	0.6	0.7	1.6
64°20′N, 37°01′E		(np)	Kns	1.0	1.1	0.8	0.5	0.1	0.3	0.7	1.0	1.1	0.8	0.3	0.4	0.9
Ostrov Nyapa (146)	(K)		Degs	304	317	326	339	76	129	135	142	142	145	311	317	304
5½ mi SSW of		(sp)	Kns	0.7	0.6	0.5	0.3	0.1	0.4	0.7	0.8	0.5	0.2	0.1	0.4	0.7
63°59.5′N, 37°09′E		(np)	Kns	0.4	0.3	0.2	0.2	0.1	0.2	0.4	0.4	0.3	0.1	0.1	0.2	0.4
Kolezhma (town), Kolezhemskiy	(K)		Degs	..	..	0	..	193	199	211	221	235	295	329	350	2
Reyd (155)		(mn)	Kns	..	..	1	0.0	1	2	3	3	2	1	3	4	4
64°15.5′N, 36°00′E																
Ostrov Golomyannyy (158)	(K)		Degs	..	330	330	300	..	175	168	185	..	..	335	332	326
W of		(mn)	Kns	..	1.3	0.9	0.4	0.0	1.2	1.5	0.9	0.0	0.0	1.4	1.8	1.5
64°23′N, 36°04′E																
Mys Zapadnyy (302)	(E)		Degs	..	338	up-to	101	101	101	101	101	90	304	293	304	304
½ mi E of			Kns	..	0.5	0.7	1.0	1.0	1.2	1.0	0.7	0.2	1.0	1.2	1.5	1.0
69°03.6′N, 36°21.3′E																
Ostrov Bol'shoy Gavrilovskiy (306)	(E)		Degs	..	315	..	113	113	113	113	124	124	124	..	281	281
1½ mi N of NW extr. of		(np)	Kns	..	0.5	0.0	0.7	1.0	1.2	1.2	1.2	1.0	0.7	0.0	0.5	0.5
69°12′N, 35°54.8′E																
Guba Teriberskaya (309)	(E)		Degs	..	191	158	146	135	135	124	101	79	79	135	191	202
3½ mi NNW of entrance		(mn)	Kns	..	0.5	0.7	1.0	1.2	1.2	1.0	0.7	0.7	0.5	0.5	0.2	0.2
69°18.4′N, 35°06′E																
Maloye Olen'ye (310), anchorage	(E)		Degs	..	293	..	101	90	90	90	101	101	101	..	304	304
69°14.5′N, 34°44′E		(mn)	Kns	..	0.5	0.0	1.0	1.2	1.0	1.0	0.7	0.7	0.5	0.0	0.7	0.7
In channel	(E)		Degs	..	293	..	113	113	113	113	112	123	326	292	292	292
		(sp)	Kns	..	0.5	0.0	1.0	1.5	1.5	1.2	1.0	0.5	0.5	1.2	1.7	1.2
Kil'dinskiy Proliv (313)	(E)		Degs	..	..	67	113	124	124	135	180	259	281	281	281	281
middle of E part of		(sp)	Kns	..	0.0	0.2	0.5	0.5	0.5	0.2	0.2	0.5	0.7	0.7	0.5	0.5
69°18.8′N, 34°18.5′E																
E of narrows	(E)		Degs	..	..	E-wd	E-wd	E-wd	E-wd	E-wd	..	W-wd	W-wd	W-wd	W-wd	W-wd
69°18′N, 34°11′E		(np)	Kns	..	0.0	0.7	1.3	1.7	1.5	1.1	0.0	0.8	1.4	1.7	1.5	0.9
Narrows	(E)		Degs	..	..	90	90	90	90	90	..	270	270	270	270	270
69°18.5′N, 34°09.5′E		(sp)	Kns	..	0.0	0.7	1.0	1.0	1.0	0.7	0.0	0.5	1.5	1.5	1.2	0.7
middle of W part of	(E)		Degs	..	90	90	101	101	112	112	112	112	101	101	101	101
69°19′N, 34°04′E		(np)	Kns	..	1	0.7	0.7	0.7	0.5	0.5	0.2	0.2	0.5	0.2	0.2	0.7
Kol'skiy Zaliv (346)	(E)	(sp)	Degs	..	11	11	0	0	0	337	349	0	349	349	0	349
1 mi E of Mys Ignat'yeva (334)		(sp)	Kns	..	0.5	0.2	0.5	0.5	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0
69°13′N, 33°32′E		(np)	Degs	..	0	0	0	11	0	0	0	0	349	349	0	0
		(np)	Kns	..	0.2	0.2	0.2	0.5	0.7	0.5	0.5	0.5	0.7	0.7	0.7	0.5
½ mi WNW of Ostrov	(E)	(sp)	Degs	..	45	45	22	33	33	22	33	45	45	45	45	45
Sal'nyy (321)		(sp)	Kns	..	0.5	0.5	0.2	0.2	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7
69°08′N, 33°26′E		(np)	Degs	..	45	45	33	..	45	45	45	45	45	33	45	33
		(np)	Kns	..	0.5	0.2	0.2	0.0	0.5	0.7	0.7	0.5	0.5	0.5	0.2	0.5
Off Mys Velikiy (332)	(E)		Degs	..	67	56	..	247	247	..	..	67	67	67	67	67
69°05′N, 33°16′E		(sp)	Kns	..	0.5	0.2	0.0	0.5	0.5	0.0	0.0	0.5	0.7	0.7	0.7	1.0
Off Guba Gryaznaya (323)	(E)		Degs	..	..	..	..	..	..	..	..	79	68	56	56	68
69°04.5′N, 33°16.5′E		(mn)	Kns	..	0.0	0.0	to ¼	to ½	to ½	to ¼	0.0	0.2	0.5	0.5	0.2	0.2
Off Mys Bazisnyy (324)	(E)		Degs	..	11	..	..	180	191	..	..	0	11	11	11	11
69°01.5′N, 33°03′E			Kns	..	0.7	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.5	0.5	0.5	0.7
Off the mooring at	(E)		Degs	..	135	158	158	158	169	191	281	338	349	349	0	34
Murmansk (325)		(sp)	Kns	..	0.5	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.2	0.2
68°59′N, 33°03′E																
Mys Khaldeyev (330)	(E)		Degs	..	33	..	191	191	191	191	..	11	22	33	33	33
½ mi WSW of		(sp)	Kns	..	0.7	0.0	0.2	1.0	0.7	0.5	0.0	0.7	1.0	1.5	1.7	1.0
68°58′N, 33°02′E																

TABLE III - 8 (Continued)

Location	HW referred to	Units	−6	−5	−4	−3	−2	−1	HW	+1	+2	+3	+4	+5	+6
Off Mys Lagernyy (329)	(E)	Degs	..	338	158	158	158	158	158	..	338	338	338	338	338
68°56.5′N, 33°01′E	(np)	Kns	..	0.5	0.7	1.5	2.0	1.5	1.0	0.0	1.2	2.0	2.5	2.0	1.2
Off Mys Drovyanoy (328)	(E)	Degs	..	326	326	..	169	169	..	326	326	326	326	326	326
68°56′N, 33°01.5′E	(sp)	Kns	..	1.0	0.5	0.0	0.5	0.5	0.0	0.5	1.2	1.5	2.2	2.2	1.5
Mys Klev-Navolok (327)	(E)	Degs	..	22	..	202	202	202	202	202	22	22	22	22	22
1/10 mi S of	(sp)	Kns	..	3.0	0.0	2.5	4.2	4.5	3.5	1.0	2.5	4.7	5.5	5.5	4.5
68°53′N, 33°00′E															
Mys Konushin (61)	(E)	Degs	245	324	330	329	331	338	60	140	146	149	153	159	228
22 mi SW of		Kns	0.3	1.1	2.1	2.6	2.4	1.7	0.4	0.9	2.4	3.0	2.3	1.5	0.5
67°00′N, 43°02′E															
Ostrov Morzhovets (82)	(E)	Degs	279	293	299	308	316	50	98	108	119	124	135	213	270
4½ mi SSW of S end of		Kns	1.4	1.9	1.9	1.4	0.8	0.3	1.0	1.7	1.9	1.6	0.9	0.4	1.1
66°35.5′N, 42°39′E															
Mys Svyatoy Nos. (281)	(E)	Degs	305	315	327	332	343	93	119	133	142	154	170	225	290
40½ mi ENE of		Kns	0.7	1.1	1.3	1.1	0.6	0.4	0.9	1.2	1.1	0.9	0.6	0.3	0.6
68°24′N, 41°27′E															
4 mi NE of Lt.	(E)	Degs	..	315	338	11	79	101	124	124	124	135	..	304	304
68°11′N, 39°54′E	(mn)	Kns	..	1¼	1	½	½	1	1¼	1	¾	¼	0.0	½	1
6¼ mi NE of Lt.	(E)	Degs	306	316	323	332	104	115	124	138	139	175	225	283	297
68°12′N, 40°00′E	(sp)	Kns	1.6	1.5	1.1	0.3	0.6	1.4	1.8	1.2	1.0	0.5	0.3	0.9	1.3
	(np)	Kns	0.9	0.8	0.6	0.2	0.4	0.8	1.0	0.7	0.6	0.3	0.2	0.5	0.7
Banka Malaya Panfilovaya (271)	(E)	Degs	274	315	337	349	5	37	89	129	153	169	195	211	257
20 mi N of		Kns	1.0	1.2	1.6	1.6	1.3	0.9	1.0	1.3	1.6	1.5	1.3	1.0	0.9
67°55′N, 42°23′E															
Guba Gorodetskaya (273)	(E)	Degs	332	332	335	338	346	20	141	152	156	160	161	162	330
10 mi E of		Kns	0.9	1.7	1.9	1.8	1.1	0.3	0.8	1.8	2.0	1.7	1.1	0.3	0.5
67°42.1′N, 41°19.7′E															
Mys Bol'shoy Gorodetskiy (274)	(E)	Degs	..	326	338	349	135	146	146	146	146	135	101	338	338
1 mi E of	(sp)	Kns	..	2.3	2.0	0.8	1.3	1.8	2.8	2.5	2.0	1.3	0.3	2.0	2.5
67°41′N, 41°02′E															
Mys Kachkovskiy (270)	(E)	Degs	311	347	350	354	358	21	123	169	167	181	209	235	303
4 mi E of	(sp)	Kns	1.9	2.4	3.1	2.8	2.0	0.6	1.5	2.8	3.3	2.6	1.6	0.7	0.9
67°26.8′N, 41°18′E	(np)	Kns	1.1	1.4	1.8	1.6	1.2	0.4	0.9	1.6	1.9	1.6	1.0	0.4	0.6
Mys Orlov Terskiy Tolstyy (268)	(E)	Degs	280	319	331	351	358	18	84	122	150	161	174	195	246
8½ mi NE of	(sp)	Kns	1.2	1.9	2.6	2.6	1.8	0.8	1.1	1.7	2.3	2.6	2.4	1.6	1.2
67°18.2′N, 41°37.8′E	(np)	Kns	0.7	1.1	1.4	1.4	1.0	0.4	0.6	1.0	1.2	1.4	1.4	0.9	0.6
Mys Krestovoy (278)	(E)	Degs	311	322	306	307	298	132	134	128	134	132	125	300	313
7¼ mi E of	(sp)	Kns	1.2	2.1	2.1	1.3	0.5	1.0	1.7	1.8	1.8	1.2	0.5	0.1	1.0
67°54.8′N, 40°39.3′E	(np)	Kns	0.7	1.2	1.2	0.7	0.3	0.5	1.0	1.0	1.0	0.7	0.3	0.1	0.6
Ostrova Ponoyskiye Ludki (263)	(E)	Degs	234	285	318	334	357	18	43	79	130	162	172	191	222
12 mi E of	(sp)	Kns	1.2	1.5	1.9	2.1	2.3	2.2	1.9	1.8	2.1	2.4	2.6	2.2	1.5
67°00′N, 41°53.7′E	(np)	Kns	0.7	0.8	1.1	1.2	1.3	1.2	1.1	1.0	1.2	1.4	1.6	1.3	0.9
3 mi E of	(E)	Degs	227	269	321	349	5	20	37	76	143	173	183	198	214
66°59.5′N, 41°30.4′E	(sp)	Kns	1.4	1.1	1.4	1.8	2.6	2.6	2.1	1.2	1.3	2.0	2.5	2.3	1.9
	(np)	Kns	0.8	0.6	0.8	1.0	1.4	1.5	1.2	0.7	0.8	1.1	1.4	1.3	1.1
Mys Krasnyy (262)	(E)	Degs	223	247	297	324	358	11	17	40	95	127	174	183	217
10 mi ESE of	(sp)	Kns	1.7	1.7	0.9	0.7	1.3	1.9	2.1	1.4	0.9	1.4	1.8	2.0	1.9
66°52.7′N, 40°43.4′E	(np)	Kns	0.9	1.0	0.5	0.4	0.8	1.1	1.2	0.8	0.5	0.8	1.0	1.1	1.1
4 mi SSE of	(E)	Degs	229	252	316	355	7	15	25	45	110	171	194	205	217
66°52.8′N, 41°43.4′E	(sp)	Kns	1.6	0.9	0.7	1.0	1.8	2.4	2.2	1.7	1.1	1.7	2.5	2.2	1.8
	(np)	Kns	0.9	0.5	0.4	0.6	1.0	1.3	1.2	0.9	0.6	1.0	1.4	1.3	1.0
Ostrov Sosnovets (259)	(E)	Degs	227	242	256	307	7	33	43	49	71	126	188	209	228
20 mi NE of	(sp)	Kns	2.1	2.0	1.3	0.6	0.9	1.8	2.4	2.2	1.4	0.9	1.0	1.7	2.1
66°37.8′N, 41°19.1′E	(np)	Kns	1.1	1.1	0.7	0.3	0.5	1.0	1.5	1.2	0.7	0.5	0.6	0.9	1.2
10½ mi ESE of	(E)	Degs	224	235	249	311	7	40	46	52	63	71	191	208	220
66°26.8′N, 41°08.9′E	(sp)	Kns	2.4	2.1	0.9	0.4	1.1	1.6	2.2	2.1	1.4	0.6	0.7	1.8	2.4
	(np)	Kns	1.3	1.2	0.5	0.2	0.6	0.9	1.2	1.2	0.8	0.3	0.4	1.0	1.3
1½ mi ESE of Lt.	(E)	Degs	225	228	242	1	26	36	44	52	88	199	209	215	224
66°28.5′N, 40°47.5′E	(sp)	Kns	2.5	1.9	0.9	0.7	1.9	2.7	3.1	2.1	0.7	0.7	1.8	2.3	2.6
	(np)	Kns	1.4	1.1	0.5	0.4	1.1	1.5	1.8	1.2	0.4	0.4	1.0	1.3	1.4
11½ mi S of Lt.	(E)	Degs	226	231	240	289	22	40	48	54	57	86	194	216	223
66°17.4′N, 40°42.5′E	(sp)	Kns	3.3	2.8	1.7	0.5	1.4	2.5	3.2	3.1	2.0	0.7	1.0	2.1	3.3
	(np)	Kns	1.8	1.6	0.9	0.3	0.8	1.5	1.8	1.8	1.2	0.4	0.6	1.3	1.9
Likhodeyevka (256)	(E)	Degs	237	238	241	65	52	51	55	59	63	211	229	230	236
E of	(sp)	Kns	2.4	1.7	0.8	0.3	1.7	2.1	2.2	2.0	1.1	0.2	1.2	2.2	2.4
66°13.6′N, 40°09′E	(np)	Kns	1.3	1.0	0.4	0.2	1.0	1.2	1.2	1.1	0.6	0.1	0.6	1.2	1.3
Mys Nikodimskiy (252)	(E)	Degs	244	248	248	250	264	38	56	58	62	71	89	209	244
15 mi SSW of		Kns	1.1	1.3	1.2	0.8	0.2	0.4	0.8	1.2	1.3	1.1	0.5	0.4	1.1
65°54′N, 38°51′E															

TABLE III - 8 (Continued)

Location	HW referred to		Units	−6	−5	−4	−3	−2	−1	HW	+1	+2	+3	+4	+5	+6
Mys Voronov (83)	(E)		Degs	248	275	315	359	34	57	69	83	102	156	191	226	245
9 mi WNW of		(sp)	Kns	2.0	1.5	1.1	1.1	1.3	1.6	1.7	1.4	1.3	1.0	1.4	1.8	2.1
66°34′N, 41°58′E		(np)	Kns	1.1	0.8	0.6	0.7	0.8	0.9	1.0	0.8	0.7	0.6	0.8	1.0	1.2
Mys Kekurskiy (369)	(E)		Degs	..	140	120	114	113	112	106	94	66	9	339	329	280
6 mi N of		(sp)	Kns	..	0.5	0.5	0.7	0.7	0.7	0.7	0.5	0.2	0.2	0.5	0.5	0.5
70°02.7′N, 32°04.5′E																

TABLE III - 9

OBSERVATIONS OF STATE OF SEA

(0700Z* and 1900Z* observations, 1932 to 1937)**

State of Sea No.	Definition	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		Percent of observations, by months											
	West Coastal Sector												
	Klaipėda (880)												
0	Calm	9	14	30	22	25	22	22	12	21	4	12	9
1	Smooth	17	18	22	20	12	20	18	25	16	15	19	22
2	Slight	21	17	21	28	32	26	27	26	22	19	31	22
3	Moderate	23	19	15	17	22	20	14	19	16	26	18	22
4	Rough	17	15	7	9	7	8	9	9	11	18	10	15
5	Very rough	6	12	2	2	2	2	7	6	8	12	10	5
6	High	5	4	1	1	..	1	2	2	4	6	1	2
7	Very high	2	..	1	..	..	..	1	1	1	..	..	3
8	Precipitous	..	1	1	1	..	..	..	..	..	..	..	..
9	Confused	..	..	..	..	..	1	..	..	..	..	..	..
	Number of obs.	168	162	170	155	180	192	196	192	192	204	189	188
	South Coastal Sector												
	Odessa (905)												
0	Calm	6	8	14	9	1	4	5	4	2	5	7	6
1	Smooth	18	12	15	18	25	28	27	31	27	14	11	10
2	Slight	17	24	24	28	35	41	44	37	37	32	21	19
3	Moderate	18	20	13	28	24	18	15	16	21	23	20	26
4	Rough	16	15	15	23	9	6	5	8	9	13	13	15
5	Very rough	15	11	10	5	3	2	2	1	2	9	15	17
6	High	8	7	1	5	1	0.5	1	0.5	2	3	8	5
7	Very high	0.5	2	5	..	1	1	1	1	0.5	0.5	2	2
8	Precipitous	1	1	2	0.5	0.5	0.5	0.5	1	..	..	1	..
9	Confused	..	..	1	1	..	..	..	1	..	..	0.5	1
	Number of obs.	239	214	272	274	284	257	259	259	255	279	266	278
	Sevastopol' (931)												
0	Calm	12	10	16	13	16	12	15	13	13	14	14	13
1	Smooth	39	42	56	63	65	59	61	57	56	56	49	47
2	Slight	24	22	17	16	12	21	13	23	20	18	23	24
3	Moderate	16	14	7	5	4	5	8	6	8	9	8	11
4	Rough	6	8	3	2	2	2	1	..	2	2	5	3
5	Very rough	2	3	1	1	..	1	..	..	..	1	1	2
6	High	..	..	..	..	..	..	..	..	..	..	..	..
7	Very high	1	..	..	..	..	..	1	..	1	..	..	..
8	Precipitous	..	..	..	..	..	0.5	1	..	..	..	..	..
9	Confused	..	0.5	..	..	..	..	..	..	..	..	..	..
	Number of obs.	255	245	259	256	262	245	256	230	254	245	250	271
	Yalta (934)												
0	Calm	3	0.5	3	9	16	14	14	13	9	8	2	1
1	Smooth	16	15	21	31	29	42	42	34	34	19	15	11
2	Slight	34	32	32	25	25	27	23	25	22	20	21	27
3	Moderate	29	29	25	20	17	12	6	20	19	33	30	34
4	Rough	11	13	11	8	9	3	9	6	8	14	19	18
5	Very rough	5	5	4	2	3	0.5	0.5	..	4	4	7	5
6	High	1	1	1	1	..	..	..	1	2	2	4	2
7	Very high	1	3	1	1	1	..	3	..	2	1	1	.
8	Precipitous	..	..	1	1	..	..	..	..	..	..	..	..
9	Confused	..	..	..	..	..	..	1	..	..	..	..	1
	Number of obs.	222	201	219	227	228	210	208	218	207	215	219	230

* Z=Greenwich time.

** No data available for North Coastal Sector.

TABLE III - 9 (Continued)

State of Sea		Percent of observations, by months											
No.	Definition	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						Feodosiya (935)							
0	Calm	1	4	2	5	2	3	5	1	2	1	2	2
1	Smooth	20	20	24	33	31	42	43	38	31	27	20	18
2	Slight	32	34	32	36	37	36	33	40	34	32	27	37
3	Moderate	21	25	23	14	13	14	12	15	21	23	21	26
4	Rough	11	12	8	6	9	3	4	4	7	10	13	12
5	Very rough	9	2	6	2	4	1	1	2	3	3	8	3
6	High	4	2	3	2	2	..	1	..	1	2	5	1
7	Very high	1	1	1	1	1	1	1	..	..	1	3	..
8	Precipitous	..	..	..	..	..	..	..	..	..	1	1	1
9	Confused	..	..	..	..	..	..	..	..	..	..	..	..
	Number of obs.	285	265	287	282	285	277	284	296	285	283	286	303
						Kerch' (939)							
0	Calm	15	5	9	8	8	11	9	7	13	14	8	6
1	Smooth	19	24	16	23	29	32	40	35	30	31	26	20
2	Slight	23	21	26	29	24	32	28	34	24	23	19	31
3	Moderate	16	25	22	22	18	15	14	16	18	14	17	22
4	Rough	13	13	12	12	12	4	7	5	10	11	14	13
5	Very rough	5	6	11	4	6	4	1	1	2	4	9	7
6	High	5	4	3	..	1	..	..	..	3	3	5	1
7	Very high	2	..	..	1	1	1	..	1	..	..	2	..
8	Precipitous	1	..	1	..	..	..	..	..	..	..	..	
9	Confused	..	..	..	..	..	..	..	..	..	..	..	
	Number of obs.	129	193	212	224	232	227	221	223	216	219	223	230

TABLE III - 10

HEIGHT AND DIRECTION OF SWELL, WEST COASTAL SECTOR
Based upon shipboard observations *
(Figure III - 11, Area I) **

Swell		Percent of observations (Jan. to June and Oct. to Dec.—no data available.)		
Condition	Approx. height (ft.)	July	Aug.	Sept.
No swell	0	33	19	..
Slight	1-6	42	37	31
Moderate	6-13	25	14	69
High	13	..	..	..
Confused	..	..	..	..
No. of obs.		12	16	13

Direction from which swell approaches	Percent of observations (Jan. to June and Oct. to Dec.—no data available.)		
	July	Aug.	Sept.
North — East	..	6	22
East — South	..	19	
South — West	50	12	39
West — North	71	44	39
No. of obs.	12	16	13

* Period of observation: 1921 to 1938.
** No data available on West and South Coastal Sectors.

TABLE III - 11

FREQUENCY DISTRIBUTION (%) OF FORCE AND DIRECTION OF WIND
(Locations of stations and areas shown on FIGURE III - 11)

NORTH COASTAL SECTOR*

January

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	1.7	2.7	1.1	0.3	0.0	0.2	6.0
NE	2.7	4.6	2.9	0.5	0.4	0.1	11.2
E	2.4	3.4	2.7	1.2	0.6	0.2	10.5
SE	4.4	6.9	4.7	1.2	0.8	0.2	18.2
S	2.9	6.7	6.2	1.6	1.1	0.4	18.9
SW	1.6	4.5	5.3	2.9	1.5	0.3	16.1
W	1.0	1.7	1.9	1.0	0.8	0.2	6.6
NW	1.2	1.6	1.2	0.8	0.4	0.1	5.3
Calm	..	..	..	..	..	..	7.0
Total	17.9	32.1	26.0	9.1	5.6	1.7	

Zaliv Mollera (17) and Mys Kanin Nos (55)

Zaliv Mollera (17) Dir.	Frequency	Mys Kanin Nos (55) Dir.	Frequency
N	4	N	9
NE	7	NE	5
E	26	E	6
SE	23	SE	15
S	13	S	22
SW	7	SW	21
W	4	W	12
NW	3	NW	7
Calm	13	Calm	3

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.6	..	..	..	0.6	1.2	2.4
NNE	0.6	..	..	..	0.6	..	1.2
NE	..	..	..	1.3	..	..	1.3
ENE	..	..	..	1.3	..	..	1.3
E	0.6	0.6	..	..	..	..	1.2
ESE	0.6	..	0.6	1.3	..	0.6	3.1
SE	1.2	..	..	0.6	..	0.6	2.4
SSE	4.4	1.3	..	..	0.6	0.6	6.9
S	3.2	0.6	1.9	..	..	..	5.7
SSW	2.5	0.6	1.3	0.6	..	0.6	5.6
SW	6.3	2.5	5.7	4.4	3.1	6.3	28.3
WSW	2.5	6.3	..	1.9	2.5	4.4	17.6
W	1.9	1.9	1.3	..	1.3	..	6.4
WNW	1.3	0.6	2.5	1.9	..	4.4	10.7
NW	..	0.6	0.6	..	0.6	..	1.8
NNW	..	..	0.6	0.6	0.6	0.6	2.4
Calm	..	..	..	..	..	..	1.3
Total	25.7	15.0	14.5	13.9	9.9	18.1	

Total number of observations: 159

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	..	..	..	0.5	1.1	1.1	2.7
NNE	..	..	..	..	..	..	..
NE	1.0	..	..	..	..	0.6	1.6
ENE	0.5	..	..	..	..	..	0.5
E	1.2	0.5	..	..	..	0.5	2.2
ESE	..	..	..	..	..	..	..
SE	1.7	1.6	0.5	..	..	..	3.8
SSE	1.6	2.2	2.2	..	..	0.5	6.5
S	17.2	3.8	8.1	2.2	3.2	4.3	38.8
SSW	4.3	1.6	1.6	0.5	..	0.6	8.6
SW	3.8	1.6	2.7	2.7	0.5	2.1	13.4
WSW	0.5	1.1	2.7	..	1.6	..	5.9
W	1.0	..	2.2	1.6	1.1	..	5.9
WNW	..	..	..	..	0.5	..	0.5
NW	..	..	1.1	..	1.5	2.2	4.8
NNW	..	..	0.5	..	0.6	0.5	1.6
Calm	..	..	..	..	..	..	3.2
Total	32.8	12.4	21.6	7.5	10.1	12.4	

Total number of observations: 186

Barents Sea (72°30′N, 30°00′E) (1)

January

Dir.	Wind force 1-3	4-7	8-12	Total
N	2.0	4.0	..	6.0
NE	2.0	7.0	1.0	10.0
E	2.0	4.0	..	6.0
SE	3.0	7.0	0.3	10.3
S	4.0	13.0	1.0	18.0
SW	3.0	24.0	1.0	28.0
W	2.0	8.0	0.3	10.3
NW	2.0	7.0	..	9.0
Calm	..	..	..	2.0
Total	20.0	74.0	3.6	

February

Dir.	Wind force 1-3	4-7	8-12	Total
N	3.0	8.0	..	11.0
NE	3.0	12.0	..	15.0
E	2.0	6.0	0.4	8.4
SE	1.0	4.0	..	5.0
S	2.0	11.0	2.0	15.0
SW	4.0	20.0	0.7	24.7
W	2.0	6.0	1.0	9.0
NW	3.0	6.0	0.4	9.4
Calm	..	..	..	4.0
Total	19.0	73.0	4.5	

March

Dir.	Wind force 1-3	4-7	8-12	Total
N	3.0	8.0	..	11.0
NE	6.0	16.0	1.0	23.0
E	4.0	11.0	0.6	15.6
SE	3.0	5.0	..	8.0
S	4.0	6.0	..	10.0
SW	4.0	11.0	..	15.0
W	1.0	5.0	..	6.0
NW	3.0	4.0	1.0	8.0
Calm	..	..	..	3.0
Total	28.0	66.0	2.6	

February

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	2.0	2.0	1.5	0.4	0.2	..	6.1
NE	2.7	3.5	2.2	0.8	0.6	0.2	10.0
E	2.1	2.4	2.1	1.3	0.6	0.1	8.6
SE	4.2	7.2	4.3	1.1	0.7	0.4	17.9
S	3.6	7.4	6.0	2.2	0.7	0.1	20.0
SW	1.7	5.0	5.9	3.4	1.2	0.4	17.6
W	1.8	2.4	1.3	0.9	0.6	0.2	7.2
NW	1.4	1.4	1.1	0.4	0.2	..	4.5
Calm	..	..	..	..	..	..	8.0
Total	19.5	31.3	24.4	10.5	4.8	1.4	

Zaliv Mollera (17) and Mys Kanin Nos (55)

Zaliv Mollera (17) Dir.	Frequency	Mys Kanin Nos (55) Dir.	Frequency
N	4	N	7
NE	5	NE	5
E	20	E	8
SE	28	SE	13
S	17	S	22
SW	6	SW	18
W	3	W	14
NW	3	NW	9
Calm	14	Calm	4

* Period of observation—Zaliv Mollera (17); 72°23′N, 52°43′E. Time of observation: 0700 local. Height: 15.1 meters.

Northwest tip of Ostrov Vaygach (27); 70°24′N, 58°48′E. July 1914 to August 1918, September 1919 to July 1935. Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.

Barents Sea (1); 72°30′N, 30°00′E. Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

February (Continued)

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	..	2.0	2.0	..	..	0.7	4.7
NNE	..	1.3	..	..	0.7	..	2.0
NE	0.7	..	..	..	..	0.7	1.4
ENE	4.6	1.3	..	2.0	..	..	7.9
E	1.4	..	0.7	0.7	..	..	2.8
ESE	1.4	1.3	2.0	0.7	..	..	5.4
SE	0.7	0.7	0.7	0.7	0.7	..	3.5
SSE	3.4	0.7	1.3	..	..	0.7	6.1
S	2.6	..	..	..	1.3	..	3.9
SSW	13.1	1.3	..	..	..	1.4	15.8
SW	4.0	2.6	4.6	3.3	2.0	2.6	19.1
WSW	5.9	2.0	0.7	4.6	1.3	1.3	15.8
W	0.7	0.7	1.3	0.7	0.7	2.0	6.1
WNW	0.7	..	0.7	0.7	0.7	..	2.8
NW	..	..	..	0.7	..	..	0.7
NNW	0.7	1.3	..	..	..	0.7	2.7
Calm	..	..	..	..	..	..	0.7
Total	39.9	15.2	14.0	14.1	7.4	10.1	

Total number of observations: 152

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	..	0.6	0.6	..	2.3	1.2	4.7
NNE	0.6	..	1.2	1.2	..	0.6	3.6
NE	2.3	..	1.2	0.6	..	..	4.1
ENE	..	..	1.2	..	..	..	1.2
E	1.2	0.6	0.6	1.2	..	..	3.6
ESE	..	..	..	..	..	..	..
SE	3.6	1.1	..	0.6	0.6	0.6	6.5
SSE	4.7	..	1.8	0.6	..	0.6	7.7
S	18.3	4.7	5.9	4.1	1.2	0.6	34.8
SSW	2.4	0.6	4.7	0.6	1.2	1.2	10.7
SW	1.8	0.6	2.3	0.6	1.2	0.6	7.1
WSW	..	..	1.2	..	0.6	..	1.8
W	..	..	0.6	..	..	..	0.6
WNW	..	..	..	..	..	..	..
NW	1.1	1.2	0.6	..	..	1.8	4.7
NNW	1.2	..	..	0.6	0.6	1.2	3.6
Calm	..	..	..	..	..	..	5.3
Total	37.2	9.4	21.9	10.1	7.1	8.4	

Total number of observations: 169

March

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	2.9	4.6	1.5	0.5	0.4	0.1	10.0
NE	2.9	5.1	3.8	0.8	1.0	0.4	14.0
E	2.1	2.7	2.7	1.2	0.6	0.4	9.7
SE	4.0	6.2	3.7	1.4	0.6	0.3	16.2
S	4.3	6.0	5.2	2.1	0.5	0.2	18.3
SW	1.7	3.7	2.8	1.3	0.5	0.4	10.4
W	1.2	1.8	1.7	0.5	0.2	0.3	5.7
NW	1.8	2.5	1.4	0.3	0.4	0.4	6.8
Calm	..	..	..	..	..	..	9.0
Total	20.9	32.6	22.8	8.1	4.2	2.5	

Zaliv Mollera (17)		Mys Kanin Nos (55)	
Frequency		Frequency	
N	4	N	7
NE	5	NE	11
E	22	E	15
SE	23	SE	15
S	12	S	19
SW	9	SW	13
W	3	W	9
NW	2	NW	7
Calm	20	Calm	4

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.6	0.6	0.6	..	..	..	1.8
NNE	0.6	0.6	1.1	1.1	..	..	3.4
NE	..	..	1.1	..	..	0.6	1.7
ENE	1.8	1.7	1.1	..	..	..	4.6
E	1.8	0.6	..	..	0.6	..	3.0
ESE	1.7	1.1	1.1	..	0.6	..	4.5
SE	4.5	1.1	1.7	0.6	..	..	7.9
SSE	1.1	0.6	0.6	..	..	..	2.3
S	4.6	0.6	0.6	..	..	..	5.8
SSW	7.5	1.7	1.1	1.1	0.6	..	12.0
SW	3.9	2.3	2.3	1.7	0.6	0.6	11.4
WSW	2.3	1.1	2.9	3.4	1.7	2.9	14.3
W	2.3	1.7	2.9	4.0	0.6	0.6	12.1
WNW	2.3	2.9	0.6	1.7	0.6	..	8.1
NW	1.1	..	..	1.1	0.6	0.6	3.4
NNW	..	0.6	0.6	0.6	..	..	1.8
Calm	..	..	..	..	..	..	2.3
Total	36.1	17.2	18.3	15.3	5.9	5.3	

Total number of observations: 175

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.6	..	0.5	..	1.1	2.1	4.3
NNE	..	..	0.6	..	0.5	..	1.1
NE	..	..	..	0.5	0.6	..	1.1
ENE	0.6	0.5	0.5	..	..	..	1.6
E	0.5	0.6	..	..	..	..	1.1
ESE	1.7	0.5	..	..	..	..	2.2
SE	2.6	1.1	0.6	1.1	..	..	5.4
SSE	4.3	..	2.7	..	..	..	7.0
S	20.9	5.9	11.3	2.2	2.1	1.6	44.0
SSW	3.8	..	2.1	..	1.6	0.5	8.0
SW	2.7	0.5	0.5	1.1	1.1	..	5.9
WSW	1.0	..	1.6	..	0.6	0.6	3.8
W	1.1	..	1.6	..	..	..	2.7
WNW	..	..	0.6	..	0.5	0.5	1.6
NW	..	..	..	0.5	0.5	3.3	4.3
NNW	1.1	..	..	..	..	..	1.1
Calm	..	..	..	..	..	..	4.8
Total	40.9	9.1	22.6	5.4	8.6	8.6	

Total number of observations: 186

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

April

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	3.1	4.2	1.9	0.3	0.2	..	9.7
NE	4.2	7.1	3.7	2.2	1.3	0.4	18.9
E	2.4	3.3	2.6	2.2	1.2	0.9	12.6
SE	3.3	4.2	2.2	0.9	0.1	0.2	10.9
S	4.1	4.7	2.7	0.7	0.2	0.3	12.7
SW	3.0	3.5	2.7	1.1	0.3	0.2	10.8
W	2.9	3.0	2.3	0.9	0.3	0.1	9.5
NW	2.6	2.3	1.6	0.9	0.1	0.2	7.7
Calm	..	..	..	..	..	..	7.0
Total	25.6	32.3	19.7	9.2	3.7	2.3	

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.8	0.6	..	..	..	..	2.4
NNE	2.9	..	1.2	..	..	..	4.1
NE	0.6	0.6	..	0.6	..	..	1.8
ENE	4.1	..	1.2	0.6	1.2	..	7.1
E	1.8	0.6	1.2	..	..	0.6	4.2
ESE	2.4	1.2	2.9	2.3	..	..	8.8
SE	0.6	1.2	0.6	1.2	0.6	..	4.2
SSE	4.8	0.6	0.6	..	..	..	6.0
S	4.2	1.2	0.6	0.6	0.6	..	7.2
SSW	5.9	2.9	0.6	..	0.6	..	10.0
SW	5.3	1.8	2.3	1.2	1.2	2.4	14.2
WSW	4.2	1.8	1.8	1.2	1.2	1.2	11.4
W	2.4	1.2	0.6	1.2	..	..	5.4
WNW	2.3	0.6	0.6	1.2	..	..	4.7
NW	0.6	1.8	0.6	0.6	..	..	3.6
NNW	1.2	1.8	1.2	0.6	..	..	4.8
Calm	..	..	..	..	..	..	1.8
Total	45.1	17.9	16.0	11.3	5.4	4.2	

Total number of observations: 171

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	4.0	4.0	0.3	8.3
NE	5.0	12.0	0.3	17.3
E	4.0	11.0	0.3	15.3
SE	6.0	7.0	0.3	13.3
S	8.0	7.0	1.0	16.0
SW	4.0	6.0	0.3	10.3
W	4.0	7.0	0.3	11.3
NW	3.0	5.0	..	8.0
Calm	..	..	..	1.0
Total	36.0	59.0	2.8	

Zaliv Mollera (17) Frequency		Mys Kanin Nos (55) Frequency	
N	7	N	8
NE	9	NE	15
E	18	E	18
SE	16	SE	13
S	12	S	17
SW	10	SW	10
W	4	W	8
NW	4	NW	7
Calm	20	Calm	4

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.4	..	1.7	..	1.1	0.5	6.7
NNE	..	..	0.6	0.5	..	..	1.1
NE	2.8	..	0.5	..	..	..	3.3
ENE	..	..	0.6	..	..	..	0.6
E	1.1	..	1.1	..	..	1.1	3.3
ESE	..	..	..	..	..	..	..
SE	1.6	..	1.1	0.6	..	..	3.3
SSE	2.8	1.7	1.1	..	0.5	..	6.1
S	14.5	2.2	8.9	0.6	1.1	1.1	28.4
SSW	1.3	1.7	2.2	0.5	1.1	..	7.8
SW	1.6	0.6	2.2	..	..	0.6	5.0
WSW	1.7	0.5	1.7	..	..	0.5	4.4
W	1.7	..	1.1	..	..	..	2.8
WNW	0.5	0.6	1.1	1.1	..	..	3.3
NW	1.1	1.1	2.8	1.7	1.7	0.5	8.9
NNW	1.1	..	0.5	..	1.1	2.3	5.0
Calm	..	..	..	..	..	..	10.0
Total	35.2	8.4	27.2	5.0	6.6	6.7	

Total number of observations: 180

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	4.6	1.0	0.3	0.7	0.3	0.4	7.4
NNE	5.7	..	0.3	..	0.4	..	6.4
NE	5.0	0.4	0.7	..	0.3	..	6.4
ENE	2.0	0.3	0.4	..	..	..	2.7
E	4.3	..	..	..	..	..	4.3
ESE	2.7	..	..	..	..	..	2.7
SE	3.7	1.0	0.3	..	..	..	5.0
SSE	3.4	0.3	0.3	0.4	0.3	..	4.7
S	7.6	1.7	0.7	..	..	..	10.0
SSW	6.4	0.3	0.3	..	0.3	..	7.3
SW	7.3	1.7	1.3	1.3	0.7	..	12.3
WSW	2.3	0.7	0.3	..	..	..	3.3
W	5.7	0.3	1.7	0.3	..	..	8.0
WNW	2.0	0.3	..	..	..	..	2.3
NW	1.0	0.3	0.3	0.3	0.4	..	2.3
NNW	2.0	0.3	0.7	..	..	..	3.0
Calm	..	..	..	..	..	..	12.0
Total	65.7	8.6	7.6	3.0	2.7	0.4	

Total number of observations: 300

* Period of observation— Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

May

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	4.9	5.2	2.4	0.4	0.1	..	13.0
NE	5.3	7.0	3.3	1.4	0.4	0.2	17.6
E	2.7	4.8	2.6	2.6	1.0	0.7	14.4
SE	2.2	2.7	2.5	1.0	0.4	0.1	8.9
S	2.9	2.6	1.3	0.4	0.2	..	7.4
SW	2.9	3.7	1.3	0.6	0.2	..	8.7
W	3.3	4.7	2.6	1.0	0.2	0.1	11.9
NW	3.3	4.7	2.1	0.8	0.3	..	11.2
Calm	..	..	..	..	..	..	7.0
Total	27.5	35.4	18.1	8.2	2.8	1.1	

Zaliv Mollera (17)

Dir.	Frequency
N	16
NE	8
E	13
SE	12
S	9
SW	8
W	8
NW	10
Calm	16

Mys Kanin Nos (55)

Dir.	Frequency
N	9
NE	14
E	14
SE	15
S	18
SW	8
W	10
NW	8
Calm	4

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.6	1.2	1.2	1.2	..	..	4.2
NNE	4.8	2.4	..	1.2	..	..	8.4
NE	3.6	0.6	0.6	0.6	..	..	5.4
ENE	5.4	0.6	0.6	1.8	..	..	8.4
E	2.4	3.0	1.2	..	..	..	6.6
ESE	2.4	0.6	1.2	0.6	..	0.6	5.4
SE	1.8	..	1.2	0.6	..	..	3.6
SSE	1.8	0.6	..	..	..	..	2.4
S	0.6	..	..	..	..	..	0.6
SSW	2.4	0.6	..	..	..	..	3.0
SW	3.0	0.6	0.6	1.8	0.6	..	6.6
WSW	6.0	1.2	1.2	1.2	1.2	..	10.8
W	1.8	..	..	..	0.6	..	2.4
WNW	6.6	1.2	4.2	3.0	..	..	15.0
NW	3.0	2.4	3.0	..	0.6	..	9.0
NNW	1.8	0.6	1.8	1.8	..	..	7.2
Calm	..	..	..	..	..	..	1.8
Total	48.0	15.6	16.8	13.8	3.0	0.6	

Total number of observations: 168

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.2	2.2	4.3	..	..	..	9.7
NNE	2.2	0.5	2.7	..	0.5	..	5.9
NE	3.3	1.1	1.6	..	..	..	5.9
ENE	..	..	..	..	..	..	..
E	0.5	..	2.2	1.6	..	..	4.3
ESE	..	..	0.5	..	..	..	0.5
SE	1.1	1.1	2.1	0.5	..	..	4.8
SSE	3.2	..	0.5	1.1	..	..	4.8
S	10.9	2.1	6.4	1.1	1.1	..	21.6
SSW	1.6	1.6	2.2	..	0.5	..	5.9
SW	1.6	0.6	1.1	0.5	..	..	3.8
WSW	0.6	..	0.5	..	0.5	..	1.6
W	3.2	0.5	2.2	0.6	..	..	6.5
WNW	..	0.5	2.2	0.5	1.1	0.5	4.8
NW	2.7	1.6	5.4	0.5	1.1	0.5	11.8
NNW	1.6	..	2.7	1.6	1.1	..	7.0
Calm	..	..	..	..	..	..	1.1
Total	35.7	11.8	36.6	8.0	5.9	1.0	

Total number of observations: 186

Barents Sea (72°30'N, 30°00'E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	8.0	4.0	..	12.0
NE	10.0	10.0	..	20.0
E	5.0	5.0	..	10.0
SE	2.0	4.0	..	6.0
S	6.0	6.0	..	12.0
SW	5.0	8.0	0.7	13.7
W	5.0	9.0	0.7	14.7
NW	5.0	5.0	..	10.0
Calm	..	..	..	2.0
Total	45.0	52.0	1.4	

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.8	0.6	2.3	1.6	0.7	..	9.0
NNE	3.9	1.0	1.3	..	0.6	..	6.8
NE	7.1	2.3	1.0	0.7	0.6	0.3	12.0
ENE	3.9	0.3	..	..	..	..	4.2
E	10.2	0.6	..	..	..	..	10.8
ESE	5.9	..	0.3	..	0.3	..	6.5
SE	7.1	0.7	..	..	..	..	7.8
SSE	0.3	0.3	..	0.4	..	..	1.0
S	1.6	0.3	..	..	..	..	1.9
SSW	2.7	0.3	0.3	0.3	..	..	3.6
SW	4.5	2.3	1.3	0.6	0.3	..	9.0
WSW	1.9	1.6	0.3	1.3	0.7	..	5.8
W	5.6	0.3	1.3	0.3	0.3	..	7.8
WNW	1.3	0.3	0.7		0.3		2.6
NW	4.3	0.6	0.3	..	..	.	5.2
NNW	1.6	..	0.3	..	..	..	1.9
Calm	..	..	..	..	..	..	4.2
Total	65.7	11.5	9.4	5.2	3.8	0.3	

Total number of observations: 309

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

June

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	3.2	4.2	1.6	0.4	0.2	..	9.6
NE	4.1	8.5	4.3	1.8	0.9	0.3	19.9
E	2.9	3.8	3.7	2.4	1.2	0.2	14.2
SE	2.0	3.2	1.8	0.8	0.4	0.1	8.3
S	2.5	2.7	0.8	0.3	0.1	0.1	6.5
SW	5.5	5.1	1.6	0.4	0.2	..	12.8
W	4.7	6.7	2.2	0.6	0.2	0.1	14.5
NW	3.2	3.7	1.0	0.1	..	..	8.0
Calm	..	..	..	..	..	..	6.0
Total	28.1	37.9	17.0	6.8	3.2	0.8	

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	4.9	0.6	..	..	..	..	5.5
NNE	5.5	..	1.8	0.6	..	..	7.9
NE	1.2	0.6	1.2	..	..	..	3.0
ENE	3.0	1.2	1.8	0.6	0.6	0.6	7.8
E	7.9	4.9	1.2	0.6	0.6	..	15.2
ESE	3.6	3.1	3.1	0.6	0.6	..	11.0
SE	0.6	..	2.5	..	0.6	..	3.7
SSE	..	0.6	..	..	..	..	0.6
S	1.2	..	..	0.6	..	..	1.8
SSW	3.7	1.8	..	0.6	..	..	6.1
SW	1.8	1.8	..	1.2	0.6	..	5.4
WSW	1.8	..	..	..	0.6	..	2.4
W	1.2	0.6	..	..	..	..	1.8
WNW	4.2	1.2	0.6	..	..	..	6.1
NW	6.7	1.2	1.8	..	..	..	9.7
NNW	7.3	0.6	..	0.6	0.6	..	9.1
Calm	..	..	..	..	..	..	1.8
Total	54.6	18.2	14.0	5.4	4.2	0.6	

Total number of observations: 163

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	7.0	3.0	..	10.0
NE	6.0	8.0	..	14.0
E	6.0	8.0	..	14.0
SE	6.0	5.0	..	11.0
S	6.0	7.0	..	13.0
SW	3.0	6.0	..	9.0
W	5.0	11.0	..	16.0
NW	7.0	5.0	..	12.0
Calm	..	..	..	0.7
Total	46.0	53.0	..	

Zaliv Mollera (17)

Frequency	
N	12
NE	12
E	10
SE	12
S	8
SW	8
W	9
NW	13
Calm	16

Mys Kanin Nos (55)

Frequency	
N	7
NE	21
E	20
SE	11
S	15
SW	7
W	8
NW	8
Calm	3

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	6.0	3.3	8.9	..	..	1.1	19.3
NNE	3.4	1.7	1.6	..	..	..	6.7
NE	5.0	1.7	2.2	..	..	..	8.9
ENE	1.1	1.1	1.7	..	..	..	3.9
E	2.8	1.1	3.3	..	..	1.1	8.3
ESE	1.1	..	1.1	..	..	..	2.2
SE	1.1	1.7	2.2	..	..	..	5.0
SSE	0.5	0.6	0.6	..	..	..	1.7
S	2.3	2.2	1.1	..	..	..	5.6
SSW	2.8	0.5	0.6	..	..	..	3.9
SW	0.5	0.6	1.1	..	..	..	2.2
WSW	0.6	..	0.6	..	0.5	..	1.7
W	1.7	0.5	1.7	..	..	..	3.9
WNW	0.6	1.1	1.1	..	..	..	2.8
NW	3.3	..	4.4	0.6	2.2	1.7	12.2
NNW	3.3	0.6	3.9	1.1	1.7	..	10.6
Calm	..	..	..	..	..	..	1.1
Total	35.0	16.7	36.1	1.7	4.4	3.9	

Total number of observations: 180

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.3	1.7	2.3	..	0.4	..	7.7
NNE	6.3	1.0	2.0	..	..	..	9.3
NE	8.7	2.0	2.7	0.3	..	..	13.7
ENE	7.3	0.7	..	..	..	..	8.0
E	10.3	1.0	..	..	..	..	11.3
ESE	4.0	0.3	0.4	..	..	..	4.7
SE	4.7	0.7	..	0.3	..	..	5.7
SSE	1.7	..	..	..	..	..	1.7
S	2.7	..	1.0	0.3	0.3	..	4.3
SSW	2.3	1.0	1.0	..	..	..	4.3
SW	5.3	1.3	0.7	0.7	0.3	..	8.3
WSW	2.7	0.3	0.7	0.3	..	..	4.0
W	2.7	0.3	0.7	0.3	0.3	..	4.3
WNW	1.3	0.3	0.7	..	..	..	2.3
NW	1.4	0.3	0.7	..	0.3	..	2.7
NNW	1.7	..	0.3	0.7	..	..	2.7
Calm	..	..	..	..	..	..	5.0
Total	66.4	10.9	13.2	2.9	1.6	..	

Total number of observations: 300

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

July

Northwest Tip of Ostrov Vaygach (27)

	Wind speed (knots)						
Dir.	2-8	9-16	17-24	25-31	32-39	>39	Total
N	3.5	5.5	2.2	0.2	..	..	11.4
NE	4.7	11.3	5.5	2.2	0.3	0.1	24.1
E	2.2	4.5	3.5	2.4	1.0	0.2	13.8
SE	1.8	2.6	1.5	0.3	0.1	..	6.3
S	2.5	2.8	1.1	0.4	0.1	..	6.9
SW	6.2	4.1	1.2	0.3	0.2	..	12.0
W	5.2	4.4	1.5	0.5	0.1	..	11.7
NW	3.9	3.0	0.7	0.1	..	..	7.7
Calm	..	..	..	..	..	..	6.0
Total	30.0	38.2	17.2	6.4	1.8	0.3	

Mys Svyatoy Nos (281)

	Wind force						
Dir.	1-3	4	5	6	7	>7	Total
N	8.6	2.0	..	0.7	..	..	11.3
NNE	2.7	2.0	1.3	..	..	..	6.0
NE	5.9	1.3	0.7	0.7	1.3	..	9.9
ENE	3.4	2.0	0.3	0.3	0.3	..	6.3
E	5.3	2.6	2.0	..	..	..	9.9
ESE	6.6	4.0	2.6	..	..	..	13.2
SE	3.3	0.7	2.0	0.7	..	..	6.7
SSE	1.4	0.7	..	..	..	..	2.1
S	1.3	..	..	..	0.7	..	2.0
SSW	2.7	2.0	..	..	0.7	..	5.4
SW	3.4	1.3	..	0.7	0.7	..	6.1
WSW	1.3	..	..	..	..	..	1.3
W	1.4	..	..	0.7	..	..	2.1
WNW	..	2.0	..	..	..	..	2.0
NW	2.7	4.0	1.3	..	..	..	8.0
NNW	4.6	0.7	..	..	..	..	5.3
Calm	..	..	..	..	..	..	2.0
Total	54.6	25.3	10.2	3.8	3.7	..	

Total number of observations: 151

Barents Sea (72°30'N, 30°00'E) (1)

	Wind force			
Dir.	1-3	4-7	8-12	Total
N	4.0	3.0	..	7.0
NE	11.0	3.0	..	14.0
E	7.0	5.0	..	12.0
SE	9.0	7.0	..	16.0
S	10.0	6.0	..	16.0
SW	6.0	5.0	..	11.0
W	6.0	4.0	..	10.0
NW	5.0	2.0	..	7.0
Calm	..	..	..	5.0
Total	60.0	35.0	..	

Zaliv Mollera (17)

	Frequency
N	15
NE	13
E	11
SE	10
S	6
SW	10
W	8
NW	9
Calm	18

Mys Kanin Nos (55)

	Frequency
N	14
NE	28
E	19
SE	8
S	12
SW	3
W	4
NW	7
Calm	5

Guba Teriberskaya (309)

	Wind force						
Dir.	1-3	4	5	6	7	>7	Total
N	10.2	7.0	6.4	0.5	0.5	..	24.6
NNE	2.7	1.6	2.1	2.2	..	..	7.0
NE	3.8	1.6	1.1	..	..	..	6.5
ENE	0.5	0.6	..	..	..	..	1.1
E	3.2	1.6	1.1	..	..	..	5.9
ESE	2.7	..	..	..	..	..	2.7
SE	0.5	..	0.6	..	..	..	1.1
SSE	1.6	..	1.6	..	..	..	3.2
S	3.8	0.5	3.8	..	..	..	8.1
SSW	2.1	0.5	1.1	0.6	..	..	4.3
SW	2.7	1.1	0.5	..	..	0.5	4.8
WSW	..	..	..	0.5	..	..	0.5
W	1.6	..	..	..	..	..	1.6
WNW	0.5	..	1.1	..	0.6	..	2.2
NW	3.8	0.5	7.5	1.1	..	..	12.9
NNW	1.7	1.6	5.9	1.1	0.5	..	10.8
Calm	..	..	..	..	..	..	2.7
Total	41.4	16.6	32.9	6.0	1.6	0.5	

Total number of observations: 186

Kem' (176)

	Wind force						
Dir.	1-3	4	5	6	7	>7	Total
N	6.5	1.3	2.9	0.3	0.3	..	11.3
NNE	6.8	1.6	0.3	0.3	..	..	9.0
NE	4.9	1.6	0.3	..	..	..	6.8
ENE	7.2	0.6	0.3	..	..	..	8.1
E	8.7	0.7	0.3	..	..	0.3	10.0
ESE	3.9	..	0.3	..	..	..	4.2
SE	6.1	1.3	1.3	..	..	..	8.7
SSE	1.3	0.6	..	..	0.3	..	2.2
S	3.9	0.3	0.3	..	..	..	4.5
SSW	1.9	0.7	..	..	..	..	2.6
SW	5.4	2.3	0.7	0.3	..	..	9.0
WSW	2.6	1.9	1.0	..	..	..	5.5
W	3.2	1.0	1.0	..	..	..	5.2
WNW	1.3	0.3	0.6	..	..	..	2.2
NW	2.9	0.3	0.7	0.3	..	..	4.2
NNW	2.3	0.3	1.0	0.3	..	..	3.9
Calm	..	..	..	..	..	..	2.6
Total	68.9	14.8	11.0	1.5	0.6	0.3	

Total number of observations: 310

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

August

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	4.6	6.2	1.5	0.1	..	..	12.4
NE	4.5	10.2	4.6	0.9	0.3	0.4	20.9
E	2.7	4.1	3.4	1.2	0.6	0.2	12.2
SE	2.5	3.9	1.5	0.2	0.1	..	8.2
S	3.9	4.3	1.2	0.1	..	..	9.5
SW	5.8	4.1	1.0	0.3	0.2	0.1	11.5
W	4.1	4.5	2.0	0.4	0.4	0.2	11.6
NW	3.4	3.4	0.7	0.1	0.1	..	7.7
Calm	..	..	..	..	..	..	6.0
Total	31.5	40.7	15.9	3.3	1.7	0.9	

Zaliv Mollera (17) / Mys Kanin Nos (55)

Zaliv Mollera (17) Dir.	Frequency	Mys Kanin Nos (55) Dir.	Frequency
N	17	N	13
NE	14	NE	18
E	12	E	15
SE	11	SE	12
S	9	S	19
SW	7	SW	4
W	7	W	6
NW	13	NW	8
Calm	10	Calm	5

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.5	..	..	0.7	0.7	..	4.9
NNE	4.2	0.7	0.7	..	..	..	5.6
NE	9.8	1.4	..	..	..	..	11.2
ENE	5.6	1.4	..	..	..	..	7.0
E	2.8	..	0.7	..	0.7	..	4.2
ESE	4.9	4.2	..	..	..	0.7	9.8
SE	2.8	1.4	1.4	0.7	..	..	6.3
SSE	1.4	0.7	..	..	..	..	2.1
S	6.3	1.4	..	..	..	..	7.7
SSW	4.2	..	..	..	..	..	4.2
SW	8.4	2.1	1.4	1.4	..	..	13.3
WSW	2.1	2.1	..	1.4	0.7	0.7	7.0
W	1.4	0.7	0.7	0.7	..	..	3.5
WNW	1.4	0.7	0.7	..	..	..	2.8
NW	4.9	..	0.7	..	..	..	5.6
NNW	3.5	0.7	..	..	..	..	4.2
Calm	..	..	..	..	..	..	1.4
Total	67.2	17.5	6.3	4.9	2.1	1.4	

Total number of observations: 144

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	7.0	3.1	3.8	..	..	..	13.9
NNE	1.7	0.5	1.6	..	..	0.5	4.3
NE	4.9	1.1	1.6	..	0.5	..	8.1
ENE	2.7	..	..	..	..	..	2.7
E	2.7	..	1.6	0.5	..	..	4.8
ESE	0.5	0.6	..	..	..	..	1.1
SE	1.6	0.5	0.6	..	..	..	2.7
SSE	3.2	..	2.2	..	..	..	5.4
S	8.1	..	5.4	0.5	1.1	..	15.1
SSW	3.3	..	4.8	..	..	..	8.1
SW	0.6	0.5	0.5	..	..	..	1.6
WSW	..	0.5	..	..	..	..	0.5
W	1.1	..	..	..	0.5	..	1.6
WNW	2.2	0.5	1.1	0.5	1.1	..	5.4
NW	4.8	2.2	2.7	1.6	0.5	..	11.8
NNW	4.8	1.1	3.8	1.1	0.5	..	11.3
Calm	..	..	..	..	..	..	1.6
Total	49.2	10.6	29.7	4.2	4.2	0.5	

Total number of observations: 186

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	5.0	3.0	..	8.0
NE	4.0	3.0	..	7.0
E	3.0	4.0	..	7.0
SE	9.0	5.0	..	14.0
S	10.0	5.0	..	15.0
SW	10.0	9.0	..	19.0
W	10.0	8.0	..	18.0
NW	5.0	4.0	..	9.0
Calm	..	..	..	2.0
Total	57.0	41.0	..	

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	4.5	1.9	0.7	..	..	..	7.1
NNE	6.2	2.3	1.9	0.3	..	0.3	11.0
NE	7.8	0.6	0.3	..	..	..	8.7
ENE	6.8	0.3	0.3	..	..	..	7.4
E	10.0	0.7	..	..	0.3	..	11.0
ESE	1.7	0.3	0.6	0.3	..	..	2.9
SE	5.4	1.3	1.0	..	..	..	7.7
SSE	2.0	..	..	0.3	..	..	2.3
S	2.5	1.0	0.3	..	..	..	4.8
SSW	1.3	0.6	1.0	..	..	..	2.9
SW	5.5	0.7	2.9	0.3	..	..	9.4
WSW	2.9	..	0.6	..	..	..	3.5
W	4.2	0.6	1.0	..	..	..	5.8
WNW	..	0.6	1.3	0.7	..	0.3	2.9
NW	2.6	0.6	0.7	0.3	..	..	4.2
NNW	2.0	1.3	0.6	..	..	..	3.9
Calm	.	..	..	..	..	..	4.5
Total	65.4	12.8	13.2	2.2	0.3	0.6	

Total number of observations: 310

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

September

Northwest Tip of Ostrov Vaygach (27)

Dir.	2-8	9-16	17-24	25-31	32-39	>39	Total
	Wind speed (knots)						
N	4.1	4.1	1.8	0.8	0.3	0.1	11.2
NE	3.9	5.2	2.7	0.6	0.1	0.1	12.6
E	3.3	4.5	3.3	0.5	0.2	..	11.8
SE	4.0	5.1	2.4	0.2	0.1	..	11.8
S	3.9	4.2	2.7	0.6	0.3	0.1	11.8
SW	2.8	4.0	3.9	0.8	0.8	0.1	12.4
W	3.1	4.8	4.0	0.6	0.5	0.1	13.1
NW	3.6	4.8	1.8	0.4	0.2	..	10.8
Calm	..	..	..	..	..	..	4.0
Total	28.7	36.7	22.6	4.5	2.5	0.5	

Zaliv Mollera (17)

Frequency	
N	18
NE	9
E	14
SE	12
S	9
SW	8
W	8
NW	11
Calm	11

Mys Kanin Nos (55)

Frequency	
N	15
NE	12
E	7
SE	9
S	21
SW	13
W	9
NW	11
Calm	3

Mys Svyatoy Nos (281)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	0.7	0.7	0.7	..	..	..	2.1
NNE	3.5	..	..	1.4	0.7	..	5.6
NE	2.8	0.7	0.7	0.7	..	..	4.9
ENE	..	..	..	..	0.7	0.7	1.4
E	4.2	2.1	0.7	0.7	0.7	..	8.4
ESE	1.4	2.7	1.4	1.4	..	..	6.9
SE	1.4	..	1.4	0.7	..	..	3.5
SSE	1.4	..	0.7	..	..	..	2.1
S	5.5	0.7	..	1.4	..	..	7.6
SSW	4.2	..	0.7	..	0.7	..	5.6
SW	2.8	..	2.1	0.7	0.7	1.4	7.7
WSW	4.2	..	1.4	0.7	0.7	..	7.0
W	4.2	1.4	1.4	0.7	1.4	0.7	9.8
WNW	2.1	2.1	2.1	2.1	1.4	..	9.8
NW	5.5	1.4	..	1.4	1.4	0.7	10.4
NNW	2.1	1.4	..	0.7	1.4	..	5.6
Calm	..	..	..	..	..	..	1.6
Total	46.0	13.2	13.3	12.6	9.8	3.5	

Total number of observations: 146

Guba Teriberskaya (309)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	2.2	1.7	5.0	0.5	1.1	..	10.5
NNE	0.6	..	2.2	..	2.2	1.1	6.1
NE	3.3	1.1	0.6	1.1	..	..	6.1
ENE	1.7	..	..	..	..	..	1.7
E	1.1	..	1.1	0.6	..	..	2.8
ESE	..	0.6	..	..	..	..	0.6
SE	1.7	0.6	0.5	..	..	..	2.8
SSE	2.2	..	0.6	..	..	..	2.8
S	11.1	0.5	7.2	..	..	..	18.8
SSW	4.4	0.5	3.9	1.1	..	0.6	10.5
SW	6.7	..	1.1	0.5	..	..	8.3
WSW	..	1.1	0.6	..	..	..	1.7
W	2.2	0.6	2.2	..	0.6	..	5.6
WNW	..	..	0.6	..	..	..	0.6
NW	4.4	..	5.0	1.1	..	..	10.5
NNW	0.6	0.6	2.2	..	0.5	..	3.9
Calm	..	..	..	..	..	..	6.7
Total	41.8	7.3	32.8	4.9	4.4	1.7	

Total number of observations: 180

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	1-3	4-7	8-12	Total
	Wind force			
N	2.0	5.0	..	7.0
NE	5.0	12.0	0.4	17.4
E	3.0	3.0	0.4	6.4
SE	2.0	9.0	..	11.0
S	3.0	7.0	..	10.0
SW	7.0	8.0	..	15.0
W	4.0	12.0	0.4	16.4
NW	3.0	12.0	..	15.0
Calm	..	..	..	0.4
Total	31.0	68.0	1.0	

Kem' (176)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	2.7	1.3	1.0	..	..	..	5.0
NNE	0.6	0.7	0.7	0.4	0.3	..	2.7
NE	3.1	1.3	..	0.3	..	..	4.7
ENE	0.7	0.3	..	..	..	..	1.0
E	4.7	..	..	..	..	..	4.7
ESE	1.0	..	0.7	..	..	..	1.7
SE	3.0	0.7	..	..	..	..	3.7
SSE	3.0	0.3	0.3	..	0.4	..	4.0
S	4.3	1.0	0.3	..	..	..	5.6
SSW	3.3	0.7	1.7	..	0.3	..	6.0
SW	9.6	2.0	3.0	0.7	..	..	15.3
WSW	7.0	2.3	1.3	..	..	..	10.6
W	7.7	1.3	3.0	0.7	0.3	..	13.0
WNW	1.7	..	1.0	..	..	..	2.7
NW	5.3	1.4	3.0	..	..	..	9.7
NNW	1.6	0.7	0.7	..	..	..	3.0
Calm	..	..	..	..	..	..	6.6
Total	59.3	14.0	16.7	2.1	1.3	..	

Total number of observations: 300

* Period of observation— Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

October

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	1.3	4.0	3.1	1.3	0.3	0.1	10.1
NE	2.3	4.1	3.1	1.7	0.6	0.2	12.0
E	2.5	3.2	3.0	1.7	0.3	..	10.7
SE	5.2	6.6	3.7	1.2	0.1	..	16.8
S	2.6	4.1	3.3	0.8	0.1	..	10.9
SW	1.4	3.7	4.6	2.3	0.5	0.2	12.7
W	1.5	4.4	3.5	1.8	0.9	0.5	12.6
NW	1.8	4.1	2.8	1.2	0.6	0.3	10.8
Calm	..	..	..	..	..	..	3.0
Total	18.6	34.2	27.1	12.0	3.4	1.3	

Zaliv Mollera (17)

Frequency	
N	10
NE	11
E	12
SE	13
S	15
SW	10
W	7
NW	10
Calm	12

Mys Kanin Nos (55)

Frequency	
N	13
NE	11
E	8
SE	13
S	14
SW	17
W	9
NW	11
Calm	4

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.2	1.2	..	..	..	0.6	3.0
NNE	0.6	0.6	0.6	..	..	0.6	2.4
NE	0.6	0.6	0.6	..	..	..	1.8
ENE	3.2	1.2	0.6	1.2	..	..	6.2
E	1.8	0.6	..	..	..	..	2.4
ESE	..	0.6	0.6	1.9	0.6	..	3.7
SE	1.8	..	0.6	1.2	..	0.6	4.2
SSE	1.2	1.9	1.2	1.2	..	0.6	6.1
S	2.4	1.2	0.6	..	..	..	4.2
SSW	4.6	3.1	1.2	1.9	1.2	1.2	13.2
SW	3.7	3.7	3.1	0.6	0.6	2.5	14.2
WSW	3.0	2.1	2.5	3.1	1.2	1.2	13.1
W	2.4	1.2	1.9	0.6	0.6	1.2	7.9
WNW	1.2	0.6	1.2	0.6	0.6	0.6	4.8
NW	0.6	0.6	..	1.9	..	..	3.1
NNW	3.7	..	..	0.6	0.6	..	4.9
Calm	..	..	..	..	..	..	1.9
Total	32.0	19.2	14.7	14.8	5.4	9.1	

Total number of observations: 162

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.6	0.5	3.8	1.6	3.2	1.1	11.8
NNE	0.5	1.1	1.1	..	1.6	..	4.3
NE	0.5	..	1.1	0.5	1.1	..	3.2
ENE	0.6	..	0.5	..	..	..	1.1
E	1.1	..	1.1	..	..	..	2.2
ESE	0.6	0.5	1.1	..	..	..	2.2
SE	0.5	..	2.2	..	..	..	2.7
SSE	4.3	1.1	..	..	0.5	..	5.9
S	15.6	3.7	1.6	2.7	0.5	..	24.1
SSW	3.7	2.2	2.7	0.5	..	..	9.1
SW	3.2	2.2	3.2	1.1	1.1	..	10.8
WSW	1.1	1.1	0.5	0.5	..	..	3.2
W	1.6	0.5	1.1	..	..	..	3.2
WNW	1.6	..	0.5	0.6	..	..	2.7
NW	1.6	0.5	0.6	0.6	..	0.5	3.8
NNW	0.5	..	1.1	0.5	..	0.6	2.7
Calm	..	..	..	..	..	..	7.0
Total	38.6	13.4	22.2	8.6	8.0	2.2	

Total number of observations: 186

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	4.0	4.0	..	8.0
NE	6.0	9.0	..	15.0
E	3.0	5.0	..	8.0
SE	2.0	9.0	..	11.0
S	6.0	11.0	1.0	18.0
SW	3.0	13.0	0.3	16.3
W	5.0	9.0	0.3	14.3
NW	5.0	4.0	..	9.0
Calm	..	..	..	0.3
Total	34.0	64.0	1.6	

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	2.7	0.6	0.3	..	..	..	3.6
NNE	1.9	..	..	..	..	..	1.9
NE	1.6	0.7	0.3	..	..	..	2.6
ENE	2.0	..	0.3	..	..	..	2.3
E	3.9	0.3	..	0.3	..	..	4.5
ESE	..	..	..	..	..	..	..
SE	1.6	..	0.3	..	..	..	1.9
SSE	2.2	..	1.0	..	..	..	3.2
S	4.8	1.3	1.3	..	0.3	..	9.7
SSW	7.5	1.6	1.0	0.3	..	0.3	10.3
SW	9.3	2.6	1.3	0.3	..	..	13.5
WSW	4.8	2.3	2.3	0.3	..	..	9.7
W	9.3	2.3	..	..	0.3	..	11.9
WNW	3.5	0.3	0.7	..	..	..	4.5
NW	3.2	0.3	0.7	..	0.3	..	4.5
NNW	3.0	..	0.6	..	..	..	3.6
Calm	..	..	..	..	..	..	12.3
Total	61.3	12.3	10.1	1.2	0.9	0.3	

Total number of observations: 310

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

November

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	1.5	3.7	2.4	1.0	0.2	0.5	9.3
NE	1.7	4.3	3.5	1.6	0.4	0.2	11.7
E	2.2	3.5	3.0	1.5	0.3	0.7	11.2
SE	3.5	6.0	3.4	0.9	0.2	0.2	14.2
S	2.0	4.7	5.0	1.7	0.5	0.2	14.1
SW	1.2	2.8	5.3	4.1	0.9	0.4	14.7
W	1.2	2.6	3.1	2.9	0.5	0.3	10.6
NW	2.0	3.4	3.0	1.4	0.8	0.7	11.3
Calm	..	..	..	..	..	..	3.0
Total	15.3	31.0	28.7	15.1	3.8	3.2	

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.7	0.6	..	..	0.6	0.6	5.5
NNE	..	..	..	..	0.6	0.6	1.2
NE	1.9	..	..	..	..	0.6	2.5
ENE	..	0.6	..	0.6	..	..	1.2
E	..	0.6	0.6	0.6	..	..	1.8
ESE	0.6	..	..	..	0.6	..	1.2
SE	0.6	1.9	0.6	..	..	..	3.1
SSE	1.8	0.6	..	..	..	0.6	3.0
S	..	1.2	1.2	0.6	0.6	..	3.6
SSW	4.9	1.9	1.9	2.5	1.2	0.6	13.0
SW	3.8	..	3.1	4.3	3.1	5.6	19.9
WSW	1.8	0.6	4.9	4.9	3.7	2.5	18.4
W	1.2	1.9	2.5	1.9	1.9	0.6	10.0
WNW	0.6	1.9	1.2	2.5	0.6	0.6	7.4
NW	0.6	0.6	0.6	0.6	..	..	2.4
NNW	0.6	..	0.6	..	1.2	..	2.4
Calm	..	..	..	..	..	..	3.1
Total	22.1	12.4	17.2	18.5	14.1	12.3	

Total number of observations: 162

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	3.0	5.0	0.7	8.7
NE	2.0	6.0	..	8.0
E	2.0	3.0	...	5.0
SE	3.0	9.0	..	12.0
S	6.0	10.0	0.3	16.3
SW	5.0	20.0	1.0	26.0
W	6.0	9.0	0.7	15.7
NW	1.0	4.0	0.7	5.7
Calm	..	..	..	3.0
Total	28.0	66.0	3.4	

Zaliv Mollera (17) Frequency		Mys Kanin Nos (55) Frequency	
N	6	N	12
NE	9	NE	6
E	25	E	6
SE	19	SE	11
S	13	S	16
SW	7	SW	20
W	4	W	14
NW	5	NW	12
Calm	12	Calm	3

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	..	0.5	1.1	1.7	2.2	1.7	7.2
NNE	..	..	..	0.5	1.7	..	2.2
NE	..	1.1	0.5	..	1.7	..	3.3
ENE	1.1	..	..	..	0.6	..	1.7
E	0.5	..	0.6	0.6	..	..	1.7
ESE	..	..	..	..	..	..	..
SE	2.2	..	1.1	0.6	..	..	3.9
SSE	5.0	0.6	..	..	..	..	5.6
S	9.4	1.7	8.9	2.2	1.1	0.5	23.8
SSW	2.3	1.7	3.3	0.5	2.2	..	10.0
SW	4.5	0.5	6.1	2.8	0.6	0.5	15.0
WSW	0.5	..	1.7	..	..	0.5	3.3
W	0.6	1.1	1.7	1.7	0.5	..	5.6
WNW	..	0.5	1.1	..	0.6	0.6	2.8
NW	..	..	0.5	..	0.5	2.9	3.9
NNW	1.7	..	..	1.1	0.5	1.1	4.4
Calm	..	..	..	..	..	..	5.6
Total	27.8	7.7	26.6	11.7	12.2	7.8	

Total number of observations: 180

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.0	0.7	1.0	..	..	..	2.7
NNE	0.6	..	0.4	..	..	..	1.0
NE	1.0	..	0.3	..	..	..	1.3
ENE	..	..	..	..	..	..	..
E	1.7	..	..	..	..	..	1.7
ESE	..	..	..	0.3	..	..	0.3
SE	2.3	0.7	0.7	..	0.3	..	4.0
SSE	3.6	0.7	..	..	..	..	4.3
S	7.0	0.4	1.3	..	..	..	8.7
SSW	7.6	0.7	1.0	..	..	..	9.3
SW	12.0	1.3	1.0	0.7	..	..	15.0
WSW	6.3	1.7	1.0	0.3	..	..	9.3
W	12.0	1.7	1.0	0.7	..	..	15.4
WNW	4.3	0.7	0.7	..	..	..	5.7
NW	4.4	0.3	0.7	..	0.3	..	5.7
NNW	1.6	0.3	0.4	..	..	..	2.3
Calm	..	..	..	..	..	..	13.3
Total	65.4	9.2	9.5	2.0	0.6	..	

Total number of observations: 300

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

NORTH COASTAL SECTOR* (Continued)

December

Northwest Tip of Ostrov Vaygach (27)

Dir.	Wind speed (knots) 2-8	9-16	17-24	25-31	32-39	>39	Total
N	1.9	3.3	2.1	1.5	0.3	0.1	9.2
NE	2.9	4.4	4.2	1.4	1.0	0.4	14.3
E	2.5	3.4	2.8	1.2	0.3	0.3	10.5
SE	4.0	6.9	4.2	1.2	0.4	0.2	16.9
S	2.6	5.8	5.2	2.1	0.9	0.2	16.8
SW	1.2	3.9	4.8	2.1	1.0	0.6	13.6
W	1.5	1.4	2.0	1.2	0.4	0.1	6.6
NW	1.5	2.4	1.9	1.0	0.2	0.1	7.1
Calm	..	..	..	..	..	..	5.0
Total	18.1	31.5	27.2	11.7	4.5	2.3	

Mys Svyatoy Nos (281)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.2	0.6	..	..	..	..	1.8
NNE	1.8	..	0.6	0.6	0.6	1.2	4.8
NE	1.3	..	1.9	..	1.3	..	4.5
ENE	..	..	1.3	0.6	..	..	1.9
E	..	0.6	0.6	..	..	..	1.2
ESE	..	1.9	0.6	0.6	1.3	..	4.4
SE	0.6	..	0.6	0.6	..	1.9	3.7
SSE	1.9	0.6	1.3	..	..	..	3.8
S	3.8	0.6	1.9	..	..	..	6.3
SSW	3.8	2.5	1.3	..	0.6	.	8.2
SW	8.8	1.9	3.8	4.4	1.9	3.4	24.2
WSW	1.2	1.9	2.5	0.6	3.2	3.8	13.2
W	1.9	2.5	2.5	2.5	2.5	1.9	13.8
WNW	..	..	1.3	1.3	..	0.6	3.2
NW	0.6	..	..	0.6	..	..	1.2
NNW	..	0.6	1.3	..	..	..	1.9
Calm	..	..	..	..	..	..	1.3
Total	26.9	13.7	21.5	11.8	11.4	12.8	

Total number of observations: 158

Barents Sea (72°30′N, 30°00′E) (1)

Dir.	Wind force 1-3	4-7	8-12	Total
N	3.0	3.0	..	6.0
NE	4.0	6.0	0.3	10.3
E	2.0	4.0	0.3	6.3
SE	2.0	7.0	..	9.0
S	5.0	9.0	0.3	14.3
SW	9.0	19.0	1.0	29.0
W	5.0	9.0	1.0	15.0
NW	4.0	5.0	..	9.0
Calm	..	..	..	1.0
Total	34.0	62.0	3.0	

Zaliv Mollera (17)

Frequency	
N	6
NE	7
E	22
SE	21
S	12
SW	8
W	4
NW	4
Calm	16

Mys Kanin Nos (55)

Frequency	
N	7
NE	7
E	11
SE	16
S	16
SW	19
W	16
NW	6
Calm	2

Guba Teriberskaya (309)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.5	..	1.6	0.5	1.1	2.2	5.9
NNE	..	..	0.5	0.6	0.5	..	1.6
NE	0.6	..	1.1	..	0.5	0.5	2.7
ENE	..	..	..	..	..	..	..
E	..	..	1.1	0.5	..	..	1.6
ESE	..	..	..	..	..	..	..
SE	1.1	..	1.6	..	..	..	2.7
SSE	3.8	..	0.5	0.5	1.1	..	5.9
S	20.9	1.6	3.8	5.4	1.1	4.3	37.1
SSW	4.9	0.5	2.1	1.6	2.2	2.7	14.0
SW	2.1	0.6	3.8	1.6	1.6	0.5	10.2
WSW	..	0.5	2.2	..	..	..	2.7
W	0.5	..	1.6	1.1	1.1	0.5	4.8
WNW	..	..	..	..	..	..	..
NW	..	..	1.1	..	..	..	1.1
NNW	0.5	..	1.6	1.1	2.2	..	5.4
Calm	..	..	..	..	..	..	4.3
Total	34.1	3.2	22.6	12.9	11.4	10.7	

Total number of observations: 186

Kem' (176)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.3	0.3	0.7	0.3	..	..	2.6
NNE	0.6	0.7	1.0	..	..	..	2.3
NE	2.6	..	0.3	0.3	0.4	..	3.6
ENE	1.0	0.3	0.3	0.7	..	..	2.3
E	2.6	..	..	..	..	..	2.6
ESE	0.6	0.7	0.3	..	..	..	1.6
SE	3.5	1.0	0.7	..	0.3	..	5.5
SSE	2.6	..	..	..	..	..	2.6
S	4.2	0.6	..	..	..	..	4.8
SSW	6.5	2.9	0.3	0.6	..	..	10.3
SW	9.4	1.0	0.6	0.3	..	..	11.3
WSW	6.1	2.0	2.0	..	0.3	..	10.4
W	9.7	2.6	..	..	0.3	..	12.6
WNW	5.8	1.0	..	..	..	..	6.8
NW	3.0	0.3	0.3	..	..	..	3.6
NNW	1.6	..	0.3	..	..	..	1.9
Calm	..	..	..	..	..	..	15.2
Total	61.1	13.4	6.8	2.2	1.3	..	

Total number of observations: 309

* Period of observation—Zaliv Mollera (17); 72°23′ N, 52°43′ E.
Time of observation: 0700 local.
Height: 15.1 meters.
Northwest tip of Ostrov Vaygach (27); 70°24′ N, 58°48′ E.
July 1914 to August 1918, September 1919 to July 1935.
Height of wind vane: 7.5 meters, July 1914 to October 1924; thereafter, 12.0 meters.
Barents Sea (1); 72°30′ N, 30°00′ E.
Estimated from Daily Weather Report of Meteorological Office, London, 0700 GMT, 1930 to 1939.

TABLE III - 11 (Continued)

WEST COASTAL SECTOR*

January

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.5	..	..	..	..	..	0.5
NNE	2.6	..	..	..	..	..	2.6
NE	2.7	..	..	..	..	..	2.7
ENE	3.3	...	..	..	..	..	3.3
E	5.9	..	..	..	..	..	5.9
ESE	3.2	..	..	..	..	..	3.2
SE	6.5	1.1	..	..	..	..	7.6
SSE	5.4	2.2	0.5	0.5	..	..	8.6
S	9.8	1.1	..	..	..	..	10.9
SSW	9.2	1.6	1.6	0.5	..	..	13.2
SW	6.5	1.6	..	0.5	..	..	8.6
WSW	2.6	1.6	0.5	1.1	0.5	..	6.3
W	6.0	..	1.6	0.5	..	0.5	8.6
WNW	3.3	2.7	..	..	..	..	6.0
NW	5.4	1.1	..	..	..	..	6.5
NNW	0.6	..	0.6	..	..	..	1.2
Calm	..	..	..	..	..	..	3.3
Total	73.5	13.0	4.8	3.1	0.5	0.5	

Total number of observations: 183

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.4	..	0.4	0.4	..	0.4	1.6
NNE	0.4	0.4	0.4	..	..	..	1.2
NE	1.2	..	0.4	..	..	..	1.6
ENE	0.8	0.4	..	..	..	..	1.2
E	4.0	0.8	..	..	..	..	4.8
ESE	3.2	4.1	2.0	..	..	..	9.4
SE	5.3	2.9	2.0	0.8	0.4	..	11.4
SSE	4.8	4.1	5.3	0.8	..	..	15.2
S	5.6	2.9	0.4	..	..	..	8.9
SSW	2.0	6.1	4.1	2.4	..	0.4	15.1
SW	6.5	0.4	1.2	0.4	..	0.4	8.9
WSW	5.3	2.0	0.8	..	..	..	8.1
W	1.6	0.4	0.8	0.8	..	..	3.7
WNW	2.0	0.4	0.8	0.8	0.4	..	4.5
NW	0.4	0.4	0.8	..	0.4	0.4	2.4
NNW	0.8	..	0.4	..	..	0.4	1.6
Calm	..	..	..	..	..	..	..
Total	44.3	25.3	19.8	6.0	1.2	2.0	

Total number of observations: 245

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	2.0	1.0	0.1	0.0	3.1
NE	3.0	2.0	0.9	0.0	5.9
E	3.0	4.0	0.6	0.0	7.6
SE	6.0	13.0	3.0	0.0	22.0
S	5.0	12.0	4.0	0.0	21.0
SW	6.0	11.0	4.0	0.0	21.0
W	4.0	5.0	0.6	0.0	9.6
NW	3.0	6.0	1.0	0.2	10.2
Calm	..	..	..	..	0.4
Total	32.0	54.0	14.2	0.2	

Klaipėda (880)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.0	2.0		0.7	0.0		5.7
NE	5.0	2.0		<0.1	0.0		7.0
E	8.0	0.8		<0.1	0.0		8.8
SE	1.5	4.0		0.0	0.0		19.0
S	9.0	8.0		1.0	0.0		18.0
SW	5.0	5.0		3.0	0.3		13.3
W	4.0	7.0		2.0	0.2		13.2
NW	5.0	6.0		3.0	0.2		14.2
Calm	..	..		..	..		0.6
Total	54.0	34.8		9.7	0.7		

February

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.8	0.6	..	..	..	..	2.4
NNE	4.2	0.6	..	0.6	..	..	5.4
NE	6.6	..	1.2	..	..	..	7.8
ENE	3.0	..	..	..	0.6	0.6	4.2
E	6.0	0.6	0.6	..	..	..	7.2
ESE	1.8	0.6	..	..	..	..	2.4
SE	4.2	2.4	..	0.6	..	..	7.2
SSE	6.0	1.2	0.6	..	..	1.2	9.0
S	8.4	1.2	1.2	..	..	0.6	11.4
SSW	3.0	1.2	1.2	..	..	0.6	6.0
SW	3.0	0.6	..	..	..	..	3.6
WSW	2.4	..	0.6	0.6	..	..	3.6
W	4.8	0.6	0.6	3.0	..	0.6	9.6
WNW	4.2	..	..	0.6	..	..	4.8
NW	6.0	..	0.6	1.2	..	..	7.8
NNW	4.2	..	1.2	..	..	..	5.4
Calm	..	..	..	..	..	..	1.8
Total	69.6	9.6	7.8	6.6	0.6	3.6	

Total number of observations: 166

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.7	0.9	1.7	0.4	0.9	..	5.6
NNE	0.4	0.4	0.4	0.9	..	0.4	2.5
NE	0.9	0.9	..	..	..	..	1.8
ENE	2.6	..	..	..	..	..	2.6
E	2.6	0.4	..	0.4	..	..	3.4
ESE	2.2	2.6	2.7	..	..	..	7.5
SE	3.5	3.1	1.7	..	0.4	..	8.7
SSE	1.3	2.2	1.7	0.9	0.4	..	6.5
S	1.1	2.6	1.7	1.3	..	..	7.9
SSW	4.4	1.3	0.9	..	..	..	6.7
SW	3.5	0.9	2.3	..	..	..	6.7
WSW	3.1	2.2	1.3	0.4	..	..	7.0
W	0.8	2.3	0.9	0.4	0.4	..	4.9
WNW	0.9	1.3	2.2	0.4	1.3	0.9	7.0
NW	1.7	2.6	0.4	1.7	1.7	0.9	8.7
NNW	4.8	2.6	0.9	1.7	0.9	1.3	12.2
Calm	..	..	..	..	..	..	..
Total	35.5	26.3	18.8	8.5	6.0	3.5	

Total number of observations: 229

*Period of observation:
Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

February (Continued)

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	2.0	0.1	..	6.1
NE	4.0	4.0	2.0	..	10.0
E	5.0	4.0	1.0	..	10.0
SE	7.0	6.0	2.0	..	15.0
S	7.0	9.0	3.0	..	19.0
SW	6.0	8.0	1.0	..	15.0
W	6.0	4.0	0.8	..	10.8
NW	8.0	4.0	0.8	..	12.8
Calm	..	..	..	..	0.7
Total	47.0	41.0	10.7	..	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	3.0	1.0	0.5	..	4.5
NE	5.0	0.6	0.2	..	5.8
E	8.0	1.0	0.2	..	9.2
SE	13.0	6.0	<.1	..	19.0
S	13.0	5.0	1.0	0.2	19.2
SW	7.0	4.0	3.0	0.4	14.4
W	6.0	6.0	2.0	..	14.0
NW	8.0	3.0	1.0	0.4	12.4
Calm	..	..	..	..	2.0
Total	63.0	26.6	8.0	1.0	

March

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.2	..	..	..	..	..	1.2
NNE	1.7	..	..	..	..	..	1.7
NE	4.5	0.6	0.6	..	..	..	5.7
ENE	4.0	..	..	0.6	0.6	..	5.2
E	6.1	..	..	..	..	..	6.1
ESE	3.3	0.6	..	..	..	..	3.9
SE	3.4	0.6	..	..	..	..	4.0
SSE	6.8	0.6	..	..	..	..	7.4
S	4.0	0.6	0.6	..	..	..	5.2
SSW	7.9	2.2	0.6	..	..	..	10.7
SW	7.3	2.2	..	..	..	..	9.5
WSW	4.5	1.1	..	..	..	..	5.6
W	8.4	3.4	1.1	..	..	..	12.9
WNW	3.9	2.2	..	0.6	..	..	6.6
NW	9.5	1.1	0.6	..	..	..	11.2
NNW	3.3	..	..	..	..	..	3.3
Calm	..	..	..	..	..	..	..
Total	79.8	15.2	3.5	1.2	0.6	..	

Total number of observations: 179

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	2.0	1.6	1.2	0.4	1.6	..	6.6
NNE	0.4	0.4	1.2	..	0.4	..	2.4
NE	1.2	0.8	0.4	0.4	..	..	2.8
ENE	2.4	1.2	0.4	..	..	..	4.0
E	2.7	0.8	0.4	..	..	..	3.9
ESE	1.6	2.7	2.7	0.8	..	..	7.8
SE	2.4	1.6	0.4	0.8	..	..	5.2
SSE	4.6	1.9	2.3	0.4	..	..	9.2
S	3.2	1.2	..	0.8	..	..	5.2
SSW	3.5	2.7	1.9	0.4	..	..	8.5
SW	2.9	3.9	1.2	0.8	..	..	8.8
WSW	2.4	1.2	2.3	1.6	..	..	7.5
W	1.2	0.8	0.8	..	..	0.4	3.2
WNW	2.4	0.8	0.4	0.4	0.8	0.8	5.6
NW	2.7	2.7	0.8	0.8	0.8	0.8	8.6
NNW	4.6	1.9	1.9	1.2	0.4	0.4	10.4
Calm	..	..	..	..	..	..	..
Total	40.2	26.2	18.3	8.8	4.0	2.4	

Total number of observations: 257

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	3.0	3.0	0.2	..	6.2
NE	4.0	6.0	2.0	..	12.0
E	2.0	2.0	0.8	..	4.8
SE	4.0	5.0	1.0	..	10.0
S	6.0	8.0	1.0	..	15.0
SW	6.0	11.0	2.0	0.2	19.2
W	7.0	8.0	0.2	..	15.2
NW	11.0	6.0	0.8	..	17.8
Calm	..	..	..	..	0.4
Total	43.0	49.0	8.0	0.2	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	2.0	<.1	..	7.0
NE	7.0	1.0	..	..	8.0
E	9.0	4.0	0.2	..	13.2
SE	11.0	6.0	0.2	..	17.2
S	9.0	4.0	0.7	<.1	13.7
SW	8.0	4.0	1.0	<.1	13.0
W	8.0	3.0	2.0	<.1	13.0
NW	8.0	5.0	0.4	..	13.4
Calm	..	..	..	..	1.0
Total	65.0	29.0	4.6	0.2	

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

April

Leningrad (811)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	2.9	0.6	0.6	..	..	..	4.1
NNE	2.3	1.1	..	..	..	..	3.4
NE	3.5	0.6	1.7	..	..	0.6	6.4
ENE	4.6	1.1	0.6	..	..	..	6.3
E	5.7	2.3	..	..	..	..	8.0
ESE	5.1	..	..	..	..	..	5.1
SE	5.1	0.6	..	..	..	..	5.7
SSE	3.5	1.1	0.6	..	..	..	5.1
S	2.8	3.4	0.6	..	..	..	6.8
SSW	4.0	..	0.6	1.1	0.6	..	6.3
SW	5.6	..	1.1	..	..	..	6.7
WSW	6.2	..	0.6	..	..	..	6.8
W	6.8	0.6	0.6	..	..	..	8.0
WNW	6.8	1.7	0.6	0.6	..	..	9.7
NW	5.6	2.3	1.1	..	..	..	9.0
NNW	0.6	..	..	..	..	..	0.6
Calm	..	..	..	..	..	..	1.1
Total	71.1	14.7	8.7	1.7	0.6	0.6	

Total number of observations: 176

Rīga (863)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	1.6	2.9	1.6	0.4	0.4	..	6.9
NNE	2.8	1.2	..	..	..	..	4.0
NE	1.2	..	0.8	..	..	..	2.0
ENE	2.4	1.6	..	..	..	..	4.0
E	0.8	0.4	..	..	..	..	1.2
ESE	0.8	1.2	2.0	0.4	0.4	..	4.8
SE	2.0	2.9	0.8	0.4	0.4	..	6.5
SSE	4.0	3.3	1.6	..	..	..	8.9
S	3.2	0.8	0.4	..	..	..	4.4
SSW	2.8	2.5	2.9	0.8	0.4	..	9.4
SW	2.0	3.3	1.6	0.4	0.4	..	7.7
WSW	0.8	1.2	1.6	2.5	..	..	6.1
W	1.2	..	0.4	..	..	..	1.6
WNW	2.0	0.4	2.5	0.4	0.4	0.4	6.1
NW	4.0	1.6	2.5	0.8	2.0	0.4	11.3
NNW	4.5	3.3	4.9	1.2	0.4	..	14.3
Calm	..	..	..	..	..	..	..
Total	36.1	26.6	23.6	7.3	4.4	0.8	

Total number of observations: 244

Tallinn (832)

Dir.	1-3	4-5	6-7	>7	Total
	Wind force				
N	4.0	2.0	0.3	..	6.3
NE	7.0	11.0	4.0	..	22.0
E	2.0	2.0	0.4	..	4.4
SE	4.0	4.0	1.0	..	9.0
S	3.0	7.0	2.0	..	12.0
SW	3.0	8.0	1.0	..	12.0
W	4.0	5.0	0.1	..	9.1
NW	18.0	4.0	0.4	..	22.4
Calm	..	..	..	..	..
Total	45.0	43.0	9.2	..	

Klaipėda (880)

Dir.	1-3	4-5	6-7	>7	Total
	Wind force				
N	4.0	2.0	0.4	..	6.4
NE	4.0	2.0	<.1	..	6.0
E	5.0	3.0	<.1	..	8.0
SE	5.0	6.0	0.3	..	11.3
S	8.0	5.0	0.2	..	13.2
SW	11.0	6.0	1.0	..	18.0
W	12.0	4.0	1.0	..	17.0
NW	12.0	6.0	1.0	..	19.0
Calm	..	..	..	..	..
Total	61.0	34.0	3.9	..	

May

Leningrad (811)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	0.5	0.5	..	..	..	..	1.0
NNE	4.4	2.2	0.5	..	..	..	7.1
NE	6.5	2.2	..	0.5	..	..	9.2
ENE	3.2	0.5	1.1	..	..	..	4.8
E	3.8	1.6	1.6	..	..	..	7.0
ESE	1.0	1.1	..	..	..	..	2.1
SE	4.9	0.5	0.5	0.5	..	..	6.4
SSE	1.0	1.1	0.5	..	..	..	2.6
S	3.2	1.6	..	..	..	..	4.8
SSW	1.6	0.5	0.5	0.5	..	..	3.1
SW	4.3	..	..	..	..	..	4.3
WSW	9.8	1.6	0.5	..	..	..	11.9
W	10.9	2.2	1.1	1.1	..	0.5	15.3
WNW	5.4	2.2	2.2	0.6	..	..	10.4
NW	3.7	2.2	..	..	..	..	5.9
NNW	2.1	..	..	..	..	..	2.1
Calm	..	..	..	..	..	..	..
Total	66.3	20.0	8.5	3.2	..	0.5	

Total number of observations: 182

Rīga (863)

Dir.	1-3	4	5	6	7	>7	Total
	Wind force						
N	6.6	5.8	4.1	2.9	..	..	19.4
NNE	2.4	1.7	0.4	0.4	..	..	4.9
NE	0.8	..	1.2	0.8	..	..	2.8
ENE	1.2	1.2	1.7	..	..	..	4.1
E	1.6	1.2	0.4	0.4	..	..	3.6
ESE	2.8	..	1.2	..	..	..	4.0
SE	0.8	1.2	1.2	0.4	0.4	..	4.0
SSE	4.2	0.4	0.4	0.8	..	..	5.8
S	1.2	..	0.8	..	..	..	2.0
SSW	0.8	2.1	0.4	..	0.4	..	3.7
SW	1.6	1.7	0.8	0.4	..	..	4.5
WSW	1.2	0.4	..	0.4	..	0.4	2.4
W	2.0	..	1.2	0.8	..	..	4.0
WNW	1.6	..	2.1	0.4	0.4	..	4.5
NW	4.1	1.7	1.2	2.1	0.4	0.4	9.9
NNW	7.9	3.7	4.1	2.9	0.4	..	19.0
Calm	..	..	..	..	..	..	..
Total	40.8	21.1	21.2	12.7	2.0	0.8	

Total number of observations: 241

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

May (Continued)

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	1.0	0.3	. .	6.3
NE	7.0	10.0	3.0	. .	20.0
E	2.0	2.0	0.6	. .	4.6
SE	2.0	5.0	1.0	. .	8.0
S	2.0	5.0	1.0	. .	8.0
SW	2.0	7.0	1.0	. .	10.0
W	4.0	5.0	1.0	. .	10.0
NW	26.0	6.0	1.0	. .	33.0
Calm	. .	. .	. .	. .	. .
Total	50.0	41.0	8.9	. .	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	4.0	0.2	. .	8.2
NE	5.0	2.0	0.2	. .	7.2
E	4.0	3.0	0.3	. .	7.3
SE	5.0	3.0	. .	. .	8.0
S	4.0	4.0	. .	. .	8.0
SW	10.0	4.0	0.6	<.1	14.6
W	16.0	4.0	0.7	<.1	20.7
NW	16.0	9.0	1.0	. .	26.0
Calm	. .	. .	. .	. .	0.3
Total	64.0	33.0	3.0	<.2	

June

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.7	. .	. .	. .	. .	. .	1.7
NNE	2.9	0.6	. .	. .	. .	. .	3.5
NE	5.3	2.3	1.2	0.6	. .	. .	9.4
ENE	4.6	1.7	0.6	. .	. .	. .	6.9
E	4.7	1.7	. .	. .	. .	. .	6.4
ESE	1.2	. .	0.6	. .	. .	. .	1.8
SE	3.4	0.6	. .	0.6	. .	. .	4.6
SSE	2.9	. .	. .	. .	. .	. .	2.9
S	1.8	. .	. .	. .	. .	. .	1.8
SSW	2.9	. .	. .	0.6	. .	. .	3.5
SW	2.9	. .	. .	. .	. .	. .	2.9
WSW	8.7	1.7	0.6	. .	. .	. .	11.0
W	12.2	1.7	0.6	0.6	. .	. .	15.1
WNW	7.0	4.1	0.6	1.2	. .	. .	12.9
NW	9.4	2.9	. .	0.6	. .	. .	12.9
NNW	1.8	. .	. .	. .	. .	. .	1.8
Calm	. .	. .	. .	. .	. .	. .	1.2
Total	73.4	17.3	4.2	4.2	. .	. .	

Total number of observations: 172

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	5.5	4.7	1.7	0.3	. .	. .	12.2
NNE	3.0	0.4	0.4	. .	. .	. .	3.8
NE	1.3	0.4	0.9	. .	0.4	. .	3.0
ENE	0.9	0.4	. .	. .	. .	. .	1.3
E	1.7	1.7	0.9	0.4	. .	. .	4.7
ESE	0.4	1.3	. .	. .	. .	. .	1.7
SE	0.9	0.4	. .	. .	. .	. .	1.3
SSE	3.0	0.9	0.9	. .	. .	. .	4.8
S	1.7	1.3	0.9	0.4	. .	. .	4.3
SSW	2.1	1.3	0.4	1.7	. .	. .	5.5
SW	2.2	0.9	1.3	0.4	. .	. .	4.8
WSW	4.5	2.1	1.3	2.1	0.4	. .	10.4
W	0.4	2.1	0.9	0.4	0.4	. .	4.2
WNW	3.4	2.6	3.4	0.9	. .	. .	10.3
NW	4.7	3.0	2.6	2.1	0.4	. .	12.8
NNW	4.2	6.8	1.7	2.1	0.9	. .	15.7
Calm	. .	. .	. .	. .	. .	. .	. .
Total	39.9	30.3	17.3	10.8	2.5	. .	

Total number of observations: 234

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	1.0	0.3	. .	6.3
NE	6.0	10.0	2.0	. .	18.0
E	1.0	0.7	. .	. .	1.7
SE	3.0	1.0	0.1	. .	4.1
S	3.0	5.0	0.3	. .	8.3
SW	2.0	7.0	1.0	. .	10.0
W	5.0	11.0	2.0	. .	18.0
NW	24.0	7.0	. .	. .	31.0
Calm	. .	. .	. .	. .	0.2
Total	49.0	42.7	5.7	. .	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	4.0	0.7	. .	8.7
NE	2.0	2.0	0.4	. .	4.4
E	2.0	1.0	. .	. .	3.0
SE	3.0	3.0	. .	. .	6.0
S	5.0	2.0	0.3	. .	7.3
SW	10.0	5.0	0.9	0.2	16.1
W	15.0	9.0	0.8	<.1	24.8
NW	17.0	11.0	1.0	0.2	29.2
Calm	. .	. .	. .	. .	0.2
Total	58.0	37.0	4.1	0.4	

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

July

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	2.7	..	..	..	..	..	2.7
NNE	4.9	1.6	..	..	..	..	6.5
NE	3.8	0.5	0.5	..	..	..	4.8
ENE	4.8	1.6	..	..	..	..	6.4
E	2.1	1.1	..	..	..	..	3.2
ESE	2.2	..	0.5	..	..	..	2.7
SE	7.6	1.1	..	..	..	..	8.7
SSE	4.9	1.1	..	..	0.5	..	6.5
S	2.2	1.6	0.5	..	0.5	..	4.8
SSW	2.7	1.1	..	..	..	0.5	4.3
SW	4.9	1.1	..	0.5	..	0.5	7.0
WSW	7.1	1.1	0.5	0.5	..	..	9.2
W	8.1	3.3	2.7	1.6	..	..	15.7
WNW	3.2	2.7	..	..	..	..	5.9
NW	5.4	1.1	0.6	..	..	..	7.1
NNW	3.7	..	..	..	..	..	3.7
Calm	..	..	..	..	..	..	1.1
Total	70.3	19.0	5.3	2.6	1.0	1.0	

Total number of observations: 184

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.5	4.4	2.2	0.4	..	..	8.5
NNE	4.0	..	..	..	..	..	4.0
NE	2.2	..	..	..	..	..	2.2
ENE	0.8	0.9	..	..	..	..	1.7
E	0.4	0.4	..	..	..	..	0.8
ESE	1.8	0.9	0.9	0.4	..	..	4.0
SE	2.6	1.8	0.4	..	..	..	4.8
SSE	3.5	3.1	..	..	..	..	6.6
S	0.9	0.9	0.4	0.9	..	..	3.1
SSW	4.3	0.9	0.9	..	..	..	6.1
SW	4.8	0.9	2.2	..	0.4	..	8.3
WSW	3.5	2.2	0.4	..	0.4	..	6.5
W	3.9	0.9	0.9	0.4	..	..	6.1
WNW	4.0	0.9	1.3	..	0.9	..	7.1
NW	5.2	2.2	1.8	0.9	..	..	10.1
NNW	7.5	4.4	2.2	1.3	0.9	..	16.3
Calm	..	..	..	..	..	..	..
Total	52.9	24.8	13.6	3.9	2.6	..	

Tallinn (832)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	7.0	1.0		..	..		8.0
NE	6.0	11.0		1.0	..		18.0
E	1.0	2.0		0.2	..		3.2
SE	3.0	4.0		0.1	..		7.1
S	3.0	5.0		1.0	0.2		9.2
SW	3.0	6.0		1.0	..		10.0
W	5.0	6.0		1.0	..		12.0
NW	24.0	9.0		0.1	..		33.1
Calm	..	..		..	..		..
Total	52.0	44.0		4.4	0.2		

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	4.0	0.3	..	9.3
NE	3.0	2.0	0.2	..	5.2
E	3.0	1.0	..	..	4.0
SE	3.0	1.0	..	..	4.0
S	4.0	1.0	0.2	..	5.2
SW	10.0	4.0	1.0	..	15.0
W	17.0	10.0	3.0	0.2	30.2
NW	16.0	10.0	0.7	..	26.7
Calm	..	..	..	..	0.3
Total	61.0	33.0	5.4	0.2	

August

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	3.2	1.1	0.5	..	..	..	4.8
NNE	5.4	1.1	..	..	..	..	6.5
NE	8.7	1.6	1.1	..	..	..	11.4
ENE	7.6	1.1	0.5	..	..	..	9.2
E	3.2	0.5	..	..	..	..	3.7
ESE	3.2	..	..	..	..	..	3.2
SE	3.2	..	..	..	..	..	3.2
SSE	4.9	0.5	0.5	..	..	..	5.9
S	2.6	1.1	2.2	..	..	..	5.9
SSW	1.6	2.2	..	..	..	..	3.8
SW	4.3	1.1	..	..	..	..	5.4
WSW	4.3	1.1	0.5	0.5	..	0.5	6.9
W	7.6	1.6	1.1	..	..	0.5	10.8
WNW	5.5	1.6	0.5	..	..	..	7.6
NW	3.8	1.1	..	..	..	1.1	6.0
NNW	2.7	..	..	..	..	..	2.7
Calm	..	..	..	..	..	..	1.6
Total	72.8	15.7	6.9	0.5	..	2.1	

Total number of observations: 183

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	9.1	5.0	1.4	0.5	..	..	16.0
NNE	4.2	1.4	..	..	..	..	5.6
NE	5.1	0.9	0.9	..	..	..	6.9
ENE	1.0	0.9	0.5	..	..	..	2.4
E	2.3	1.8	0.9	0.5	..	..	5.5
ESE	2.7	1.4	0.5	..	..	..	4.6
SE	1.0	0.5	0.5	..	..	..	2.0
SSE	2.3	0.9	..	..	..	..	3.2
S	2.3	3.7	0.5	..	..	..	6.5
SSW	2.3	0.9	0.5	0.5	..	..	4.2
SW	1.4	0.9	0.5	0.5	..	..	3.3
WSW	1.9	2.3	0.9	0.5	..	..	5.6
W	3.3	0.9	0.9	..	..	0.5	5.6
WNW	4.6	0.5	0.5	0.5	..	..	6.1
NW	5.5	1.8	1.4	0.5	0.5	..	9.7
NNW	5.5	3.7	2.3	0.9	0.9	..	13.3
Calm	..	..	..	..	..	..	0.5
Total	54.5	27.5	12.2	4.4	1.4	0.5	

Total number of observations: 218

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

August (Continued)

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	6.0	1.0	0.3	..	7.3
NE	6.0	9.0	1.0	..	16.0
E	2.0	1.0	..	..	3.0
SE	4.0	5.0	0.6	..	9.6
S	4.0	8.0	0.9	..	12.9
SW	5.0	8.0	1.0	0.2	14.2
W	5.0	7.0	0.4	0.1	12.5
NW	17.0	6.0	0.2	0.1	23.3
Calm	..	..	..	..	0.4
Total	49.0	45.0	4.4	0.4	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	2.0	0.3	..	7.3
NE	3.0	1.0	..	..	4.0
E	3.0	0.5	<.1	..	3.5
SE	5.0	2.0	<.1	..	7.0
S	4.0	3.0	<.1	.	7.0
SW	9.0	6.0	2.0	..	17.0
W	15.0	10.0	3.0	0.8	28.8
NW	14.0	9.0	2.0	0.2	25.2
Calm	..	..	..	..	..
Total	58.0	33.5	8.0	1.0	

September

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	2.7	1.7	1.1	..	..	..	4.5
NNE	1.1	1.1	0.6	..	..	..	2.8
NE	2.2	1.1	0.6	..	..	..	3.9
ENE	1.2	..	..	..	..	..	1.2
E	1.2	..	..	..	..	..	1.2
ESE	3.4	..	..	..	..	..	3.4
SE	4.5	..	..	..	0.6	..	5.1
SSE	4.5	1.1	0.6	..	..	..	6.2
S	3.4	0.6	..	..	..	..	4.0
SSW	6.8	2.8	1.7	0.6	..	..	11.9
SW	10.2	4.0	..	..	..	..	14.2
WSW	6.8	2.3	1.1	0.6	..	..	10.8
W	10.2	2.3	0.6	1.7	..	..	14.8
WNW	3.4	0.6	1.7	0.6	..	..	6.3
NW	3.9	0.6	0.6	..	..	..	5.1
NNW	1.8	..	..	0.6	..	..	2.4
Calm	..	..	..	..	..	..	2.8
Total	67.3	18.2	8.6	4.1	0.6	..	

Total number of observations: 177

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.7	3.1	..	1.3	1.3	0.4	7.8
NNE	1.3	0.9	0.4	..	..	..	2.6
NE	0.9	..	..	0.9	..	..	1.8
ENE	0.8	..	0.4	..	..	..	1.2
E	1.3	0.4	0.4	..	..	..	2.1
ESE	1.7	2.7	1.8	0.9	..	..	7.1
SE	1.3	0.9	0.4	..	..	..	2.6
SSE	4.0	2.7	1.8	0.4	..	..	8.9
S	1.7	2.2	1.3	0.4	..	..	5.6
SSW	2.6	3.1	1.3	0.4	..	..	7.8
SW	4.0	1.8	0.4	1.3	..	..	7.5
WSW	4.0	2.2	1.8	3.5	..	..	11.5
W	1.3	1.8	1.8	1.3	..	..	6.2
WNW	2.6	0.9	0.4	1.3	..	0.4	5.6
NW	3.1	1.3	4.0	0.9	0.9	..	10.1
NNW	3.5	4.9	1.3	1.3	..	..	11.0
Calm	..	..	..	..	..	..	0.4
Total	35.8	28.9	17.5	13.9	2.2	0.8	

Total number of observations: 226

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	5.0	3.0	..	..	8.0
NE	4.0	5.0	1.0	..	10.0
E	2.0	2.0	0.1	..	4.1
SE	4.0	5.0	1.0	..	10.0
S	4.0	7.0	0.8	..	11.8
SW	4.0	11.0	2.0	0.2	17.2
W	6.0	8.0	2.0	0.2	16.2
NW	12.0	9.0	2.0	0.3	23.3
Calm	..	..	..	..	0.2
Total	41.0	50.0	8.9	0.7	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	3.0	0.5	<.1	7.5
NE	5.0	1.0	2.0	..	8.0
E	5.0	2.0	<.1	..	7.0
SE	7.0	3.0	<.1	..	10.0
S	7.0	4.0	0.2	<.1	11.2
SW	8.0	7.0	2.0	0.4	17.4
W	10.0	7.0	4.0	0.4	21.4
NW	9.0	7.0	2.0	0.3	18.3
Calm	..	..	..	..	0.5
Total	55.0	34.0	10.7	1.1	

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

October

Leningrad (811)

Dir.	1-3	4	5	6	7	>7	Total
			Wind force				
N	2.1	..	..	..	..	..	2.1
NNE	2.2	0.5	0.5	..	..	..	3.2
NE	3.2	..	..	..	..	..	3.2
ENE	4.3	1.1	..	..	..	..	5.4
E	4.8	0.5	..	..	..	..	5.3
ESE	2.6	..	..	..	..	..	2.6
SE	2.7	2.7	0.5	..	..	..	5.9
SSE	2.7	2.7	0.5	..	..	..	5.9
S	9.2	4.3	0.5	0.5	..	..	14.5
SSW	5.3	2.2	0.5	0.5	1.1	..	9.6
SW	4.8	2.2	1.1	..	0.5	..	8.6
WSW	7.5	2.2	0.5	0.5	..	..	10.7
W	5.4	1.1	0.5	0.5	..	0.5	8.0
WNW	3.8	1.1	..	..	..	..	4.9
NW	4.9	..	1.1	..	..	0.5	6.5
NNW	0.6	0.6	..	..	..	..	1.2
Calm	..	..	..	..	..	..	1.6
Total	66.1	21.2	5.7	2.0	1.6	1.0	

Total number of observations: 185

Rīga (863)

Dir.	1-3	4	5	6	7	>7	Total
			Wind force				
N	0.4	0.4	..	..	..	..	0.8
NNE	2.6	0.4	..	0.4	..	..	3.4
NE	3.0	1.3	..	0.4	..	..	4.7
ENE	2.6	0.4	0.4	..	..	..	3.4
E	2.7	1.3	..	0.4	..	..	4.7
ESE	2.2	0.9	0.4	..	..	..	3.5
SE	1.2	1.3	1.7	0.9	..	..	5.1
SSE	3.4	4.8	3.5	..	0.4	..	12.1
S	1.7	3.1	0.4	1.3	..	0.4	6.9
SSW	5.3	3.1	2.6	1.3	1.3	..	13.6
SW	3.5	3.9	1.7	0.9	..	0.4	10.4
WSW	3.5	2.6	3.1	1.3	..	..	10.5
W	2.2	0.9	0.9	..	..	..	4.0
WNW	2.2	0.4	0.9	1.3	0.4	0.4	5.6
NW	1.2	0.4	1.3	0.4	0.4	..	3.7
NNW	1.8	2.2	1.7	0.4	..	0.4	6.5
Calm	..	..	..	..	..	..	0.4
Total	39.5	27.4	18.6	9.0	2.5	1.6	

Total number of observations: 229

Tallinn (832)

Dir.	1-3	4-5	6-7	>7	Total
		Wind force			
N	4.0	2.0	0.9	..	6.9
NE	3.0	3.0	0.9	..	6.9
E	2.0	2.0	0.7	..	4.7
SE	4.0	7.0	1.0	..	12.0
S	6.0	8.0	2.0	0.1	16.1
SW	8.0	10.0	2.0	0.3	20.3
W	5.0	7.0	0.7	0.1	12.8
NW	7.0	8.0	2.0	0.3	17.3
Calm	..	..	..	..	0.9
Total	39.0	47.0	10.2	0.8	

Klaipėda (880)

Dir.	1-3	4	5	6	7	>7	Total
			Wind force				
N	5.0	2.0		0.2	0.2		7.4
NE	4.0	1.0		..	..		5.0
E	8.0	2.0		..	..		10.0
SE	13.0	7.0		0.2	..		20.2
S	12.0	6.0		0.6	<.1		18.6
SW	7.0	5.0		1.0	0.2		13.2
W	6.0	5.0		2.0	0.6		13.6
NW	6.0	4.0		1.0	0.6		11.6
Calm	..	..		..	..		0.5
Total	61.0	32.0		5.0	1.6		

November

Leningrad (811)

Dir.	1-3	4	5	6	7	>7	Total
			Wind force				
N	3.4	..	..	..	..	..	3.4
NNE	2.9	0.6	..	..	..	..	3.5
NE	2.3	..	..	..	..	..	2.3
ENE	1.1	1.7	..	..	..	0.6	3.4
E	4.0	..	0.6	..	..	..	4.6
ESE	2.3	..	..	..	..	..	2.3
SE	6.3	0.6	0.6	..	..	..	7.5
SSE	10.8	2.3	1.7	0.6	..	..	15.4
S	13.2	1.1	1.1	0.6	..	..	16.0
SSW	5.1	1.1	..	..	..	..	6.2
SW	9.8	1.1	1.1	..	..	..	12.0
WSW	3.4	1.1	0.6	..	..	..	5.1
W	1.1	1.7	1.7	0.6	0.6	..	5.7
WNW	2.3	0.6	..	..	..	..	2.9
NW	2.8	..	..	0.6	..	0.6	4.0
NNW	3.4	0.6	..	..	..	..	4.0
Calm	..	..	..	..	..	..	1.7
Total	74.2	12.5	7.4	2.4	0.6	1.2	

Total number of observations: 175

Rīga (863)

Dir.	1-3	4	5	6	7	>7	Total
			Wind force				
N	0.4	..	0.5	..	..	..	0.9
NNE	0.4	0.4	0.4	..	..	..	1.2
NE	3.5	0.4	0.4	..	..	..	4.3
ENE	1.7	0.9	0.4	..	..	..	3.0
E	1.7	0.4	..	..	..	..	2.1
ESE	1.3	2.6	0.9	0.4	0.7	..	5.9
SE	5.2	5.7	1.8	0.4	0.4	..	13.5
SSE	5.3	4.8	6.6	1.3	..	..	18.0
S	6.2	4.8	1.3	0.4	..	..	12.7
SSW	6.2	4.4	1.3	..	..	..	11.9
SW	3.1	2.2	..	0.9	..	..	6.2
WSW	4.9	2.2	..	..	..	..	7.1
W	1.7	0.9	1.3	..	..	..	3.9
WNW	0.8	..	0.4	..	0.4	0.4	2.0
NW	2.2	0.4	..	..	..	0.9	3.5
NNW	1.7	..	1.3	0.4	..	..	3.4
Calm	..	..	..	..	..	..	..
Total	46.3	30.1	16.6	3.8	1.5	1.3	

Total number of observations: 228

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

WEST COASTAL SECTOR* (Continued)

November (Continued)

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	3.0	3.0	0.4	..	6.4
NE	3.0	3.0	0.9	..	6.9
E	5.0	3.0	0.3	..	8.3
SE	10.0	6.0	2.0	0.4	18.4
S	7.0	10.0	0.9	0.2	18.1
SW	8.0	10.0	2.0	..	20.0
W	4.0	5.0	0.8	..	9.8
NW	4.0	5.0	2.0	..	11.0
Calm	..	..	..	..	0.9
Total	44.0	44.0	9.3	0.6	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	2.0	0.2	..	6.2
NE	7.0	1.0	0.2	..	8.2
E	7.0	2.0	<.1	..	9.0
SE	16.0	6.0	0.6	..	22.6
S	8.0	7.0	0.8	..	15.8
SW	5.0	6.0	3.0	0.7	14.7
W	2.0	8.0	4.0	0.2	14.2
NW	4.0	3.0	2.0	0.3	9.3
Calm	..	..	..	..	0.7
Total	53.0	35.0	10.8	1.2	

December

Leningrad (811)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	1.7	..	1.7	..	..	..	3.4
NNE	1.1	..	0.6	0.6	..	..	2.3
NE	6.2	1.1	..	..	..	..	7.3
ENE	3.9	..	..		..	..	3.9
E	3.9	..	..	..	..	..	3.9
ESE	4.5	..	..	..	..	..	4.5
SE	6.2	..	..	0.6	..	..	6.8
SSE	7.3	..	..	..	..	..	7.3
S	6.7	1.7	0.6	0.6	..	..	9.6
SSW	6.7	1.7	..	..	..	..	8.4
SW	12.2	1.1	..	0.6	..	0.6	14.5
WSW	5.3	1.1	1.1	..	..	..	7.5
W	3.3	1.1	0.6	1.1	0.6	.	6.7
WNW	3.4	1.1	..	..	..	..	4.5
NW	3.3	..	0.6	0.6	..	..	4.5
NNW	3.9	..	0.6	..	..	..	4.5
Calm	..	..	..	..	..	..	1.7
Total	79.6	8.9	5.8	4.1	0.6	0.6	

Total number of observations: 180

Rīga (863)

Dir.	Wind force 1-3	4	5	6	7	>7	Total
N	0.4	0.4	..	0.9	0.4	0.4	2.9
NNE	1.2	0.4	..	0.4	0.4	..	2.4
NE	4.9	1.8	0.4	..	..	..	7.1
ENE	4.0	1.8	..	..	..	..	5.8
E	3.1	0.9	..	0.4	..	..	4.4
ESE	3.9	2.7	0.9	0.4	0.4	..	8.3
SE	3.0	4.0	0.9	1.3	..	..	9.2
SSE	6.6	5.8	3.1	..	..	..	15.5
S	4.5	3.1	1.8	0.9	0.4	..	10.7
SSW	2.2	3.1	1.3	..	0.4	..	7.0
SW	3.6	1.8	1.3	..	..	..	6.7
WSW	1.3	1.8	2.7	1.3	..	..	7.1
W	1.3	2.7	0.9	..	..	..	4.9
WNW	1.7	..	..	0.4	0.4	0.4	2.9
NW	..	0.4	1.3	0.4	..	0.4	2.5
NNW	..	0.4	1.3	..	0.4	..	2.1
Calm	..	..	..	..	..	..	..
Total	41.7	31.1	15.9	6.4	2.8	1.2	

Total number of observations: 226

Tallinn (832)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	3.0	3.0	0.4	..	6.4
NE	2.0	4.0	0.2	..	6.2
E	4.0	3.0	0.5	..	7.5
SE	7.0	9.0	2.0	..	18.0
S	7.0	12.0	2.0	0.2	21.2
SW	8.0	12.0	1.0	..	21.0
W	3.0	6.0	0.9	..	9.9
NW	4.0	4.0	1.0	..	9.0
Calm	..	..	..	..	0.9
Total	38.0	53.0	8.0	0.2	

Klaipėda (880)

Dir.	Wind force 1-3	4-5	6-7	>7	Total
N	4.0	1.0	0.2	..	5.2
NE	6.0	1.0	0.2	..	7.2
E	9.0	1.0	<.1	..	10.0
SE	16.0	7.0	0.2	..	23.2
S	10.0	7.0	0.6	<.1	17.6
SW	6.0	6.0	1.0	0.9	13.9
W	4.0	5.0	3.0	0.6	12.6
NW	4.0	3.0	2.0	0.4	9.4
Calm	..	..	..	..	0.6
Total	59.0	31.0	7.2	2.0	

*Period of observation: Leningrad (811) .... 1300Z, 1932 to 37
Rīga (863) .... 1300Z, 1932 to 37
Tallinn (832) .... 1100Z, 1920 to 34
Klaipėda (880) .... 1300Z, 1904 to 1920; 1923 to 1925

TABLE III - 11 (Continued)

SOUTH COASTAL SECTOR *

January

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	2	23	..	..	25
NE	2	3	14	3	..	22
E	4	..	..	..	..	4
SE	8	..	..	..	..	8
S	11	..	5	..	..	16
SW	..	..	3	..	..	3
W	2	4	6	3	..	15
NW	2	3	..	..	..	5
Calm	..	..	..	..	..	2
Vbl.	..	..	..	..	..	..
Total	29	12	51	6	..	

Total number of observations: 42

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	4	..	4	..	8
NE	..	8	..	..	..	8
E	..	..	..	..	..	..
SE	13	4	..	..	..	17
S	..	4	5	..	..	9
SW	4	..	..	..	..	4
W	12	4	4	4	8	32
NW	..	21	..	..	..	21
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	29	45	9	8	8	

Total number of observations: 24

February

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	5	..	4	5	..	14
NE	5	..	4	..	..	9
E	3	3	..	..	..	6
SE	3	3	..	..	..	6
S	6	7	..	..	..	13
SW	12	2	6	..	..	20
W	3	..	3	..	..	6
NW	6	3	..	..	..	9
Calm	..	..	..	..	..	14
Vbl.	..	..	..	..	..	3
Total	43	18	17	5	..	

Total number of observations: 35

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	17	..	..	..	17
NE	..	6	..	..	..	6
E	..	..	..	..	..	..
SE	..	..	..	..	..	..
S	11	5	10	5	6	37
SW	..	6	..	..	..	6
W	..	5	17	..	..	22
NW	..	6	..	5	..	11
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	11	45	27	10	6	

Total number of observations: 18

March

Areas IV and V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	10	4	3	..	..	17
NE	12	..	5	..	..	17
E	17	4	..	..	..	21
SE	..	..	..	..	..	..
S	..	3	..	..	..	3
SW	6	..	..	..	..	6
W	6	1	4	..	2	13
NW	8	8	4	..	..	20
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	2
Total	59	20	16	..	2	

Total number of observations: 48

April

Areas IV and V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	5	1	..	..	6
NE	18	6	..	..	..	24
E	14	1	..	..	..	15
SE	5	..	..	..	..	5
S	3	2	..	..	..	5
SW	7	3	..	..	..	10
W	8	4	1	..	..	13
NW	6	1	..	..	..	7
Calm	..	..	..	..	..	14
Vbl.	..	..	..	..	..	..
Total	61	22	2	..	..	

Total number of observations: 59

May

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	..	..	..	..	..
NE	5	10	5	..	..	20
E	5	..	5	..	..	10
SE	..	..	..	..	..	..
S	15	5	..	..	..	20
SW	..	..	..	..	..	..
W	5	5	..	..	..	10
NW	15	5	5	..	..	25
Calm	..	..	..	..	..	10
Vbl.	..	..	..	..	..	..
Total	45	25	15	..	..	

Total number of observations: 20

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	5	2	..	..	..	7
NE	17	..	..	..	..	17
E	10	..	2	..	..	12
SE	5	2	..	..	..	7
S	4	..	..	..	..	4
SW	10	3	2	..	..	15
W	10	2	..	..	..	12
NW	5	2	4	..	..	11
Calm	..	..	..	..	..	14
Vbl.	..	..	..	..	..	1
Total	66	11	8	..	..	

Total number of observations: 72

* Period of observation—1900 to 1914; 1921 to 1938.

TABLE III - 11 (Continued)

SOUTH COASTAL SECTOR (Continued)

May

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	8	..	..	..	..	8
NE	19	..	..	..	..	19
E	13	..	..	..	..	13
SE	23	..	..	..	..	23
S	..	..	..	..	..	..
SW	..	4	..	..	..	4
W	..	..	5	..	..	5
NW	12	..	5	..	..	17
Calm	..	..	..	..	..	9
Vbl.	..	..	..	..	..	..
Total	75	4	10	..	..	

Total number of observations: 22

June

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	1	2	2	..	..	5
NE	2	..	..	..	..	2
E	..	..	..	..	..	..
SE	10	2	..	..	..	12
S	17	5	..	..	..	22
SW	10	..	..	..	..	10
W	25	2	..	..	..	27
NW	13	..	..	..	..	13
Calm	..	..	..	..	..	8
Vbl.	..	..	..	..	..	..
Total	78	11	2	..	..	

Total number of observations: 52

June

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	..	..	..	..	..
NE	5	..	5	..	..	10
E	..	10	..	..	..	10
SE	..	..	..	..	..	..
S	10	..	..	..	..	10
SW	15	15	..	..	..	30
W	5	..	..	..	..	5
NW	5	5	..	..	..	10
Calm	..	..	..	..	..	20
Vbl.	..	..	..	..	..	5
Total	40	30	5	..	..	

Total number of observations: 20

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	7	1	..	..	..	8
NE	11	2	2	..	..	15
E	9	3	..	..	..	12
SE	5	1	..	..	..	6
S	6	4	..	..	..	10
SW	10	1	..	..	..	11
W	10	4	2	..	..	16
NW	5	2	2	..	..	9
Calm	..	..	..	..	..	6
Vbl.	..	..	..	..	..	4
Total	63	18	6	..	..	

Total number of observations: 120

July

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	16	4	3	..	..	23
NE	..	3			..	3
E	7	..	..	..	..	7
SE	..	..	..	..	..	0
S	20	3	..	..	..	23
SW	7	..	3	3	..	13
W	3	..	..	..	..	3
NW	7	6	10	..	..	23
Calm	..	..	..	..	..	0
Vbl.	..	..	..	..	..	0
Total	60	16	16	3	0	

Total number of observations: 30

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	13	10	7	..	..	30
NE	8	3	6	..	..	17
E	2	..	..	..	..	2
SE	..	..	..	..	..	..
S	12	..	..	..	..	12
SW	2	..	..	..	..	2
W	21	3	5	..	..	2
NW	..	..	..	..	..	29
Calm	..	..	..	..	..	4
Vbl.	..	..	..	..	..	2
Total	58	16	18	..	..	

Total number of observations: 52

August

Areas III and V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	10	10	..	..	..	20
NE	16	3	2	..	..	21
E	4	..	..	..	..	4
SE	..	..	..	..	..	..
S	4	..	..	..	..	4
SW	4	..	..	..	..	4
W	5	5	4	..	..	14
NW	7	10	2	..	..	19
Calm	..	..	..	..	..	11
Vbl.	..	..	..	..	..	2
Total	50	28	8	..	..	

Total number of observations: 53

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	17	6	5	..	..	28
NE	27	2	6	..	..	35
E	3	4	1	..	..	8
SE	4	2	..	..	..	6
S	..	..	..	..	..	..
SW	5	..	..	..	..	5
W	5	..	..	..	..	5
NW	7	3	1	..	..	11
Calm	..	..	..	..	..	1
Vbl.	..	..	..	..	..	..
Total	68	17	13	..	..	

Total number of observations: 91

* Period of observation—1900 to 1914; 1921 to 1938.

TABLE III - 11 (Continued)

SOUTH COASTAL SECTOR (Continued)

August

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	10	5	5	..	..	20
NE	20	10	5	..	..	35
E	5	5	..	..	..	10
SE	..	..	..	..	..	..
S	..	..	..	..	..	..
SW	25	..	..	..	..	25
W	..	..	..	..	..	..
NW	10	..	..	..	..	10
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	70	20	10	..	..	

Total number of observations: 19

September

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	..	..	..	..	..
NE	5	..	5	..	..	10
E	16	..	..	..	..	16
SE	5	..	..	..	..	5
S	5	..	5	..	..	10
SW	20	5	..	..	..	25
W	5	..	..	..	..	5
NW	13	..	..	..	..	13
Calm	..	..	..	..	..	11
Vbl.	..	..	..	..	..	5
Total	69	5	10	..	..	

Total number of observations: 19

September

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	3	3	10	..	..	16
NE	3	..	10	..	..	13
E	6	2	3	5	..	16
SE	11	..	..	..	..	11
S	6	5	..	..	..	11
SW	14	4	..	..	..	18
W	..	..	..	..	..	..
NW	..	3	..	..	..	3
Calm	..	..	..	..	..	6
Vbl.	..	..	..	..	..	3
Total	43	17	23	5	..	

Total number of observations: 35

Area III

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	3	..	4	..	..	7
NE	6	4	..	..	..	10
E	10	3	..	..	..	13
SE	3	..	..	..	..	3
S	7	6	..	..	..	13
SW	6	10	..	..	..	16
W	17	3	..	..	..	20
NW	..	..	..	..	..	..
Calm	..	..	..	..	..	7
Vbl.	..	..	..	..	..	10
Total	52	26	4	..	..	

Total number of observations: 30

September

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	4	6	2	..	..	12
NE	4	3	2	..	..	9
E	10	3	9	..	..	22
SE	7	3	2	..	..	12
S	2	2	..	..	..	4
SW	3	3	1	..	..	7
W	10	2	2	..	..	14
NW	4	2	5	1	..	12
Calm	..	..	..	..	..	4
Vbl.	..	..	..	..	..	1
Total	44	24	23	1	..	

Total number of observations: 99

October

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	4	11	..	..	15
NE	21	9	9	..	..	39
E	12	4	..	..	..	16
SE	4	..	..	..	..	4
S	4	4	..	..	..	8
SW	..	..	..	..	..	
W	..	..	..	..	..	
NW	9	..	..	..	..	9
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	50	21	20	..	..	

Total number of observations: 24

October

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	4	4	12	..	..	20
NE	11	11	..	..	..	22
E	..	..	..	..	..	..
SE	..	..	..	..	..	..
S	8	4	11	..	..	23
SW	..	4	12	..	..	16
W	..	..	..	..	..	..
NW	8	..	8	..	..	16
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	31	23	43	..	..	..

Total number of observations: 25

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	13	3	2	..	..	18
NE	8	3	5	1	..	17
E	7	1	1	..	..	9
SE	7	1	1	..	..	9
S	2	1	..	..	..	3
SW	5	4	..	..	..	9
W	8	5	1	..	..	14
NW	3	1	1	1	..	6
Calm	..	..	..	..	..	3
Vbl.	..	..	..	..	..	7
Total	53	19	11	2	..	..

Total number of observations: 88

* Period of observation—1900 to 1914; 1921 to 1938.

TABLE III - 11 (Continued)

SOUTH COASTAL SECTOR (Continued)

November

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	6	..	..	..	6
NE	..	..	..	..	..	..
E	26	6	..	..	..	32
SE	8	..	..	..	..	8
S	..	..	7	..	..	7
SW	..	..	..	..	..	..
W	6	6	..	..	..	12
NW	28	5	..	..	..	33
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	68	23	7	..	..	

Total number of observations: 15

Area III

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	6	5	..	..	11
NE	..	5	..	5	5	15
E	..	5	..	5	5	15
SE	..	..	..	..	..	..
S	..	..	5	..	..	5
SW	5	..	20	..	..	25
W	5	..	..	..	..	5
* NW	11	..	5	..	..	16
Calm	..	..	..	..	..	5
Vbl.	..	..	..	..	..	..
Total	21	16	35	10	10	

Total number of observations: 19

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	6	4	..	..	..	10
NE	9	3	1	..	..	13
E	15	7	7	..	..	29
SE	3	4	..	..	..	7
S	5	2	1	..	..	8
SW	9	10	1	..	..	20
W	3	1	1	..	..	5
NW	..	1	1	..	..	2
Calm	..	..	..	..	..	1
Vbl.	..	..	..	..	..	..
Total	50	32	12	..	..	

Total number of observations: 83

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	..	5	5	..	10
NE	8	5	..	..	..	13
E	..	..	5	5	5	15
SE	6	5	..	..	..	11
S	6	4	..	..	..	10
SW	8	4	..	..	..	12
W	6	8	..	..	..	14
NW	4	2	..	..	..	6
Calm	..	..	..	..	..	2
Vbl.	..	..	..	..	..	2
Total	38	28	10	10	5	

Total number of observations: 51

December

Area II

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	12	..	..	..	..	12
NE	5	..	20	..	..	25
E	..	..	12	..	..	12
SE	..	..	..	..	..	..
S	6	5	..	5	6	22
SW	6	..	..	..	..	6
W	6	..	5	..	..	11
NW	..	..	11	..	..	11
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	35	5	48	5	6	

Total number of observations: 17

Area IV

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	..	1	6	2	..	9
NE	1	1	6	1	..	9
E	7	5	4	..	..	16
SE	7	3	..	..	..	10
S	10	1	3	2	..	16
SW	3	2	..	..	..	5
W	1	4	2	..	..	7
NW	..	7	6	2	..	15
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	29	24	27	7	..	

Total number of observations: 60

Area V

Dir.	Wind force 1-3	4	5-6	7	8-12	Total
N	7	2	12	..	..	21
NE	..	3	..	..	..	3
E	3	..	..	..	..	3
SE	6	..	..	..	..	6
S	17	2	..	..	..	19
SW	11	3	3	..	..	17
W	8	..	3	..	..	11
NW	5	5	8	..	..	18
Calm	..	..	..	..	..	..
Vbl.	..	..	..	..	..	..
Total	57	15	26	..	..	

Total number of observations: 37

* Period of observation—1900 to 1914; 1921 to 1938.

TABLE III - 12

REPORTED SEA, SWELL, AND SURF CONDITIONS AT SPECIFIC LOCATIONS, PARTICULARLY IN ANCHORAGES OR ADJOINING AREAS

Locality	Exposed to	Sea, Swell, and Surf Conditions
NORTH COASTAL SECTOR:		
Bolvanskaya Guba (40)	Northwesterly winds	Heavy sea, rough even for large ships, forms during exposure to strong winds.
68°32′N 52°11′E	Northerly winds	During sea of force 4-5, waves are so high that entrance into bay is not recommended. A steep wave large enough to throw vessels from the roadstead appears at the bar. Waves bend as a "collar" onto each of the two to five sandbanks which are present. After passing these banks, the approach to shore is somewhat smoother and through long, sloping waves. The sand bars are a dangerous area even during northerly winds of force 2 or 3 as waves are said to be sufficiently high even then to swamp boats with a normal load. Northerly winds greater than force 3 produce waves that are a definite hazard in the debarkation of personnel or supplies from shore.
Chëshskaya Guba (49)	Northerly winds	When exposed to strong winds, rough sea with steep waves occur in eastern and southern parts of bay.
Pesha (50)		Strong surf over shoals at river mouth during storms.
Poluostrov Kanin (54)	Winds from western half of compass	Although swell may be low off beach, it may smash surf boats. During periods of high seas, the waves, entering the cove at high tide from the southern and open side, roll across the submerged reef and raise a strong surf.
Mys Kanin Nos (55)	Winds from western half of compass	Even slight swell near shore may present particularly dangerous conditions for landing. Swell rushes into cleft with great force.
Tarkhanovo (56)		Strong surf has been reported.
Kiya (59)	Northwesterly winds	Swell enters only at intervals close to high water and breaks on northern bank.
Reach #1	Westerly winds	Heavy swell rolls in across shoal with incoming tide.
Chizha (64)		Swell does not enter river mouth, but breaks along the outer coast.
Nes' (66)	Westerly winds	Swell enters only at high water; breaks on the drying coast areas at low water.
Guba Troitskaya (118)	Northerly winds	Swell comes from the northern quadrant.
Ostrov Solovetskiy (120)		Anchorage sheltered from northerly and easterly winds which are particularly violent as they blow across the entire Gorlo (257) into the basin and produce a heavy sea. The island, high and wooded, keeps this sea out. Swell from the northeast and east does not reach the channel.
Guba Pushlakhta (133)	Northwesterly and westerly winds	Dangerous anchorage during westerly winds because of heavy seas rolling into the bay. During westerly winds, waves break on the shoal.
Mys Letniy Orlov (131)	West-southwesterly and west-northwesterly winds	When exposed to winds of force 5 or greater, a very rough sea is produced with waves breaking on the shoal.
Lyamitskiye Stamiki (138)		Rock outlined by breakers during periods of swell, but shows only as a ripple during calm weather.
Onega (143)	Westerly and northwesterly winds	When exposed to strong winds, steep, heavy sea occurs.
Ostrov Razostrov (160)	Northerly and northwesterly winds	Northerly winds raise a heavy swell and render anchorage unsafe.
Bol'shoy Sorokskiy Reyd (170)	Northeasterly winds	When exposed to strong winds, there is a rather heavy and turbulent sea. Anchorage calm when not directly exposed.
Guba Pon'gama (183)		
Outer road	Easterly winds	High swell refracted into roadstead partially reduced in height by coastal shoal.
Inner road	Easterly winds	Slight sea during easterly winds of storms.
Chernaya Reka (204)		
Outer road	Southeasterly winds	When exposed to strong winds, heavy sea rolls in through strait.
Varzuga (247)	Southeasterly to westerly winds	When exposed to strong winds, there is a heavy surf that carries in sand. An appreciable transport of water shoreward also occurs under such conditions. Southerly winds give rise to choppy seas.
Mys Svyatoy Nos (281)	Northwesterly and northerly winds	Strong currents develop cross seas that are particularly dangerous during flood tide. Area of cross sea is about 6 miles long, up to 2,000 feet in width, and lies to the northeast and east of Mys Svyatoy Nos (281) during rising water and to the north on the falling tide. During easterly winds, waves in the cross sea may reach 18 feet in height.
Ostrov Zelenyy (284)	Winds from the northwest and north	Possible to anchor along south side of island although swell rolls into the strait between the island and Ostrov Medvezhiy (285).
Ostrov Medvezhiy (285)		Vessels should not anchor opposite this strait because troublesome swell may roll through it.

TABLE III - 12 (Continued)

Locality	Exposed to	Sea, Swell, and Surf Conditions
NORTH COASTAL SECTOR: (Continued)		
Ostrov Vitte (287)		As this location is sheltered from wind waves and swell, it is possible to anchor during flood tide. Swells enter west of the middle of the island. Although the width of the strait between Ostrov Vitte (287) and Ostrov Zelenyy (284) is 600 feet, the swell enters with very little spreading; beyond, however, the anchorage is very rough and dangerous for small vessels.
Zakhrebetnoye (301)	Northwest to east winds	Unsuitable anchorage when waves are from the northwest. During winds from the northeastern quadrant, the anchorage is calm at low tide but becomes extremely rough at high tide.
Guba Zelenetskaya (304)	Southwesterly winds	Gusty, strong, southwest winds produce high waves; well protected from other quadrants.
Guba Podpakhta (305)	Northerly and easterly winds	Swell enters the bay during northerly and easterly winds.
Guba Voron'ya (308)	Northwesterly and westerly winds	Southern part of bay has many sand banks on which swell from storms forms high breakers. Swell comes largely from north and northwest.
Guba Teriberskaya (309)	Northerly winds	Heavy swell at times of low water and northerly winds.
Maloye Olen'ye (310)	Westerly and northwesterly winds	Heavy swell occurs during strong westerly and northwesterly winds.
Kil'dinskiy Proliv (313)		High swell rolling into the strait causes center of strait to be extremely rough.
Kol'skiy Zaliv (340)		Southern shore offers no shelter when a swell rolls in from the sea.
Mys Lodeynyy (341)	Northeasterly and easterly winds	When exposed to strong winds, this area offers no shelter and has very high, continuous breakers.
Mys Pogan'-Navolok (343)	Northeasterly winds	Dangerous surf when exposed to strong winds.
Guba Korelinskaya (344)	Winds from north and northwest	Unsafe when exposed because of choppy seas; also may be made unsafe by drift of ice during winter months.
Mys Voriy (345)	Northerly winds	When exposed, heavy sea rolls into the bay and renders anchorage unsafe.
Guba Kislaya (349)	Winds from east and southeast	Shelter available from all winds; protected against rough seas.
WEST COASTAL SECTOR:		
Nevskaya Guba (812)	Easterly winds	Heavy seas produced during easterly winds.
Kronshtadt (813)	Easterly winds	Heavy seas build up quickly during easterly winds.
Luzhskaya Guba (818)	Northerly winds	Heavy seas occur when exposed to strong winds.
Tallinn (832)	Winds from northwest and north	Heavy seas occur when exposed to strong winds.
Paldiski (836)	Winds from northwest and north	Entrance can be made only during good weather. Swell breaks over bar and breakwater during strong winds.
Gulf of Riga (866)	Westerly winds	Heavy seas build up with onset of westerly winds and decrease rapidly in height as wind falls off.
Klaipėda (880)	Winds from western quadrant	Not a safe anchorage, for heavy seas are quickly generated with onset of strong winds from western half of compass.
SOUTH COASTAL SECTOR:		
Yevpatoriya (928)	Winds from southeast and the west-southwest	Eastern winds raise a choppy sea; coast to south affords considerable protection from winds from southeast and south and does not permit much of a sea to form.
Yalta (934)	Strong northwest winds	Difficult to land or leave mole during violent squalls; heaviest seas come from the east-southeast. During winter, the most frequent seas come from the east-northeast and east. In some years, a swell from the southeast quadrant has been observed to prevail for greater part of the year. The bay is generally smooth about a third of the year.
Feodosiyskaya Bukhta (935)		East winds send in a heavy swell.
Arabat (944)	Winds from north and northeast	Heavy sea occurs when exposed to strong winds.
Genichesk (947)	Southeasterly winds	Southeasterly gale causes heavy sea; sheltered from all other directions.

[redacted]

TABLE III - 13

ICE DATA
U.S.S.R.

PART A: NORTH COASTAL SECTOR

Location	Number of years of record	Number of years with ice	Date of appearance of ice: Earliest	Date of appearance of ice: Average	Date of appearance of ice: Latest	Date of closing of navigation: Earliest	Date of closing of navigation: Average	Date of closing of navigation: Latest	Date of opening of navigation: Earliest	Date of opening of navigation: Average	Date of opening of navigation: Latest	Date of disappearance of ice: Earliest	Date of disappearance of ice: Average	Date of disappearance of ice: Latest	Average annual number of days with ice	Average annual number of days closed to navigation	Average maximum thickness of ice
Abramov, Mys (79)	5	5	Oct. 30	Nov. 8	Dec. 1	...	Nov. 29	...	...	May 21	...	May 6	May 27	Jun. 20	200	172	..
Arkhangel'sk (104)	15	15	Oct. 19	Nov. 11	Nov. 30	...	...	...	...	...	...	May 11	May 21	Jun. 6	190	..	30"
Bol'shoy Gorodetskiy, Mys (274)	6	6	Oct. 1	Jan. 22	Feb. 7	...	...	...	...	...	...	May 5	May 26	Jun. 13	124	..	..
Bol'shoy Zhuzhmuy, Ostrov (161)	18	18	Oct. 20	Dec. 3	Jan. 4	...	Dec. 8	...	...	May 18	...	May 16	Jun. 1	Jun. 9	147	160	27"
Chesmenskiy, Mys (135)	7	7	Nov. 1	Nov. 18	Dec. 22	...	...	...	...	...	...	May 16	Jun. 1	Jun. 9	192	..	27"
Intsy, Mys (88)	7	7	Oct. 30	Nov. 14	Dec. 13	...	...	...	...	...	...	May 2	May 14	May 28	180	..	81"
Iokaniga (283)	6	6	Jan. 26	Feb. 16	Mar. 25	...	...	...	...	...	...	Apr. 8	May 16	Jul. 2	57	..	..
Kandalakshskaya, Guba (189)	5	5	Oct. 18	Oct. 31	Nov. 16	...	Nov. 26	...	...	May 22	...	May 21	May 25	May 28	204	176	..
Kanin Nos, Mys (55)	5	5	Nov. 22	Nov. 2	Dec. 23	...	...	...	...	...	...	May 29	Jun. 8	Jul. 1	216	..	..
Kem' (176)	5	5	Oct. 19	Nov. 11	Nov. 29	...	Nov. 30	...	...	May 13	...	May 9	May 18	May 26	187	163	70"
Kola (326), river mouth	..	..	...	Oct. 21	...	...	Nov. 29	...	...	May 11	...	...	May 25	...	..	..	..
Kovda, Guba (207)	5	5	Oct. 12	Oct. 28	Nov. 26	...	Nov. 15	...	...	May 16	...	May 19	May 26	Jun. 2	208	181	..
Letniy Orlov, Mys (131)	7	7	Nov. 19	Dec. 8	Dec. 26	...	...	...	...	...	...	May 8	May 24	Jun. 5	166	..	..
Mezen' (72)	4	4	Oct. 9	Oct. 19	Oct. 27	...	...	...	...	...	...	May 14	May 18	May 22	209	..	..
Morzhovets, Ostrov (82)	21	21	Nov. 2	Nov. 26	Dec. 25	...	Dec. 5	...	...	May 20	...	Apr. 23	Jun. 3	Jun. 28	187	..	..
Mud'yugskiy, Ostrov (100)	20	20	Oct. 24	Nov. 3	Nov. 29	...	...	...	...	...	...	May 16	May 25	Jun. 11	202	..	24"
Murmansk (325)	6	..	Nov. 5	Jan. 25	Mar. 7	...	...	...	...	...	...	Mar. 16	May 13	Jun. 5	..	..	..
Onega (143)	5	5	Oct. 19	Oct. 24	Nov. 7	...	Nov. 20	...	...	May 8	..	May 5	May 16	Jun. 6	202	138	69"
Orlov Terskiy Tolstyy, Mys (268)	21	21	Dec. 3	Dec. 29	Feb. 1	...	...	...	...	...	...	May 13	Jun. 6	Jul. 27	182	..	..
Saida, Guba (338)	..	..	...	Oct. 30	...	...	...	...	...	...	...	...	Apr. 30	...	180	..	..
Solovetskiy, Ostrov (120)	4	4	Oct. 16	Nov. 17	Dec. 10	...	Dec. 25	...	...	May 12	...	May 18	May 27	Jun. 5	190	137	..
Sosnovets, Ostrov (259)	20	20	Oct. 27	Dec. 12	Jan. 1	...	...	...	...	...	...	Apr. 13	Jun. 4	Jul. 8	182	..	..
Svyatoy Nos, Mys (281)	18	17	Dec. 9	Feb. 13	Apr. 12	...	...	...	...	...	...	Mar. 13	May 6	Jul. 7	25	..	44"
Teriberskaya, Guba (309)	5	5	Nov. 5	Dec. 2	Jan. 16	...	...	...	...	...	...	May 26	Jun. 14	Jul. 10	85	..	..
Vayda, Guba (370)	7	7	Nov. 28	Dec. 23	...	...	...	...	...	...	...	...	Apr. 6	May 2	103	..	..
Zhizhiginskiy, Ostrov (115)	21	21	Oct. 28	Dec. 4	Dec. 26	...	...	...	...	...	...	May 14	Jun. 3	Jul. 4	180	..	35"
Zimnegorskiy, Mys (94)	21	21	Nov. 1	Nov. 25	Dec. 16	...	...	...	...	...	...	May 3	May 18	Jun. 22	173	..	20"

[redacted]

Original

PART B: WEST COASTAL SECTOR

Location	Number of years of record	Number of years with ice	Date of appearance of ice			Date of closing of navigation			Date of opening of navigation			Date of disappearance of ice			Average annual number of days with ice	Average annual number of days closed to navigation	Av. annual number days navigation maintained by icebreakers	Number of years of record navigation maintained throughout winter
			Earliest	Average	Latest	Earliest	Average	Latest	Earliest	Average	Latest	Earliest	Average	Latest				
Abruka (869)	11	11	Nov. 16	Dec. 14	Feb. 1	...	...	...	...	...	...	Mar. 23	Apr. 24	May 15	125	54	31	..
Ainazi (862)	17	17	Nov. 22	Dec. 31	Mar. 12	Dec. 19	Jan. 20	Feb. 28	Mar. 19	Apr. 12	May 5	Mar. 24	Apr. 21	May 17	112	82	..	..
Akmenrags (877)	12	9	Dec. 11	Jan. 10	Feb. 9	...	...	...	...	...	...	Feb. 9	Mar. 18	May 4	28	0	..	..
Baltiysk (Pillau) (885)	38	38	Nov. 5 (1919)*	Dec. 6	Jan. 1 (1914)*	...	...	...	...	...	...	Feb. 18 (1920)*	Mar. 9	Apr. 15 (1917)*	59	0	..	..
Banka Verkkomatala (808)	12	12	Dec. 26	Dec. 29	Feb. 3	Dec. 10	Jan. 7	Feb. 5	Apr. 3	Apr. 25	May 13	Apr. 14	Apr. 30	May 16	122	108	..	0
Bryusterort, Mys (Brüster Ort) (884)	37	29	Dec. 12	Jan. 10	...	...	...	...	...	...	...	...	Feb. 16	Apr. 19	10	0	..	..
Elblag (Elbing) (889), channel to, in Frisches Haff (888)	29	29	Nov. 5 (1920)*	Dec. 4	Jan. 11 (1913)*	...	...	...	...	...	...	Feb. 6 (1914)*	Mar. 20	Apr. 18 (1924)*	91	49	..	..
Haapsalu (847)	11	11	Nov. 9	Dec. 4	Jan. 29	...	...	...	...	...	...	Apr. 4	Apr. 21	May 3	130	100	13	..
Kaliningrad (Königsberg) (883)	30	30	Nov. 3	Dec. 3	Jan. 11	...	...	...	...	...	...	Feb. 26	Mar. 27	Apr. 19	106	15	..	..
Kaliningrad (883), sea canal	38	38	Nov. 3 (1919)*	Dec. 5	Jan. 11 (1913)*	...	...	...	...	...	...	Feb. 26 (1910)*	Mar. 24	Apr. 20	100	10	..	..
Keri (830)	42	40	Dec. 19	Jan. 25	Mar. 17	Jan. 10	Feb. 15	Mar. 16	Feb. 25	Mar. 16	Apr. 14	Mar. 2	Apr. 22	May 30	87	29	..	..
Kihnu (861)	34	33	Nov. 2	Dec. 12	Feb. 1	Dec. 4	Jan. 27	Mar. 1	Feb. 21	Mar. 31	Apr. 20	Mar. 14	Apr. 27	May 15	136	63	..	..
Kiipsaar, Mys (855)	37	36	Dec. 1	Jan. 7	Feb. 23	...	...	...	...	...	...	Feb. 10	Apr. 1	Apr. 30	84	..	..	..
Klaipėda (880)	29	29	Nov. 14	Dec. 16	Mar. 15	...	...	...	...	...	...	Jan. 30	Mar. 19	Apr. 21	54	2	..	..
Klaipėda (880), entrance	37	35	Nov. 20	Dec. 28	Mar. 15	...	...	...	...	...	...	Dec. 19	Mar. 10	Apr. 29	24	0	..	..
Klaipėda (880), open sea	31	16	...	...	...	...	...	...	...	...	...	...	...	...	1	0	..	..
Kolkasrags (872), NE	12	11	Dec. 17	Jan. 13	Feb. 6	...	...	...	...	...	...	Feb. 13	Apr. 15	May 14	69	5	39	..
Kolkasrags (872), NW	12	11	Dec. 22	Jan. 13	Feb. 6	...	...	...	...	...	...	Feb. 13	Apr. 16	May 13	64	5	31	..
Kolkasrags (872), SE	12	11	Dec. 23	Jan. 14	Feb. 12	...	...	...	...	...	...	Feb. 12	Apr. 14	May 17	63	5	38	..
Kopu Poolsaar (844)	14	12	Nov. 23	Jan. 7	Feb. 17	...	...	...	...	...	...	Feb. 8	Mar. 17	Apr. 28	69	0	..	14
Koyviston Salmi, Proliv (804)	12	12	Nov. 28	Dec. 25	Jan. 29	Dec. 20	Jan. 13	Feb. 5	Mar. 3	Apr. 6	May 8	Apr. 15	Apr. 28	May 7	124	93	..	0
Kronshtadt (813)	47	47	Oct. 21	Nov. 16	Dec. 24	Nov. 14	Dec. 11	Feb. 19	Mar. 1	Mar. 15	May 7	Apr. 6	May 3	May 21	169	94	..	..
Kübassaar (857)	11	11	Nov. 16	Dec. 17	Mar. 11	...	...	...	...	...	...	Mar. 31	Apr. 29	May 17	129	85	13	..
Leningrad (811)	10	10	...	Nov. 15	...	Dec. 30	Jan. 22	Feb. 15	Apr. 20	May 5	May 25		May 15	...	161	103	..	..
Liepāja (878), harbor	17	16	Nov. 10	Jan. 8	Feb. 13	...	...	...	...	...	...	Dec. 27	Mar. 1	Apr. 13	52	0	..	..
Liepāja (878), open sea	17	..	Dec. 16	Jan. 5	Feb. 18	...	...	...	...	...	...	Jan. 5	Feb. 19	Apr. 11	45	0	..	..

* Year of occurrence of absolute extreme indicated in parentheses.

PART B: WEST COASTAL SECTOR *(Continued)*

Location	Number of years of record	Number of years with ice	Date of appearance of ice: Earliest	Date of appearance of ice: Average	Date of appearance of ice: Latest	Date of closing of navigation: Earliest	Date of closing of navigation: Average	Date of closing of navigation: Latest	Date of opening of navigation: Earliest	Date of opening of navigation: Average	Date of opening of navigation: Latest	Date of disappearance of ice: Earliest	Date of disappearance of ice: Average	Date of disappearance of ice: Latest	Average annual number of days with ice	Average annual number of days closed to navigation	Av. annual number days navigation maintained by icebreakers	Number of years of record navigation maintained throughout winter
Luga (819)	..	..	...	Dec. 15	Jan. 15	Feb. 1	...	...	...	Apr. 15	...	...	...	...	..	74	..	..
Lysiy Nos, Mys (810)	12	12	Nov. 21	Dec. 7	Jan. 11	Jan. 1	Jan. 31	Feb. 24	Apr. 11	Apr. 22	May 11	Apr. 22	Apr. 29	May 15	143	81	..	7
Mersrags (865)	37	36	Dec. 3	Jan. 15	Mar. 1	Jan. 11	Feb. 9	Mar. 13	Jan. 26	Mar. 17	Apr. 17	Feb. 9	Apr. 11	May 18	86	36	..	..
Mikelbāka (871)	15	15	Dec. 7	Jan. 5	Feb. 10	Mar. 5	Mar. 10	Mar. 14	Mar. 20	Apr. 5	Apr. 20	Feb. 12	Mar. 30	May 12	84	26	..	..
Mo'hn'i (825)	42	40	Dec. 1	Jan. 21	Mar. 17	Jan. 8	Feb. 11	Mar. 9	Jan. 15	Mar. 18	Apr. 13	Feb. 19	Apr. 20	May 27	89	35	..	..
Naissaar (831)	42	40	Dec. 20	Jan. 25	Mar. 17	Feb. 2	Feb. 20	Mar. 24	Feb. 21	Mar. 17	Apr. 24	Mar. 7	Apr. 18	May 30	83	25	..	..
Narva Jõesuu (822)	43	43	Nov. 7	Dec. 28	Feb. 8	Dec. 21	Jan. 24	Mar. 17	Feb. 3	Apr. 2	May 7	Mar. 27	Apr. 27	May 28	120	68	..	..
Ovisi (875)	15	15	Dec. 22	Jan. 9	Mar. 15	Mar. 6	Mar. 11	Mar. 16	Mar. 22	Mar. 28	Apr. 4	Feb. 26	Mar. 28	May 12	78	24	..	13
Osmussaar, Ostrov (838)	42	36	Dec. 17	Jan. 30	Mar. 23	Feb. 26	Feb. 27	Mar. 21	Mar. 3	Mar. 11	Mar. 27	Feb. 24	Apr. 10	May 18	70	12	..	..
Ostrov Karavalday (816)	..	..	...	Dec. 8	...	...	...	...	...	...	...	...	May 5	...	158	..	..	..
Pakri Neem (835)	43	40	Dec. 10	Jan. 31	Mar. 23	Feb. 10	Feb. 26	Mar. 13	Feb. 20	Mar. 11	Mar. 26	Feb. 18	Arp. 11	May 25	70	13	..	..
Paldiski (836)	..	..	...	Jan. 15	...	...	...	...	...	...	...	...	Apr. 15	...	90	15	15	..
Pape (879)	16	12	Dec. 19	Jan. 20	Feb. 12	...	...	...	...	...	...	Jan. 2	Mar. 18	Apr. 9	16	0	..	..
Pärnu (860)	35	35	Nov. 6	Dec. 1	Feb. 1	Nov. 24	Dec. 18	Jan. 12	Mar. 16	Apr. 10	Apr. 27	Mar. 21	Apr. 22	May 20	147	113	..	2
Pykhli-Sari, Mys (820)	12	12	Nov. 22	Dec 22	Jan. 16	Jan. 1	Jan. 25	Feb. 24	Apr. 12	Apr. 24	May 11	Apr. 18	Apr. 30	May 11	129	89	..	7
Raugi (851)	12	12	Nov. 21	Dec. 23	Mar. 23	Dec. 4	Jan. 6	Feb. 7	Mar. 16	Apr. 18	May 13	Mar. 24	Apr. 17	May 14	115	102	..	0
Rīga (863), harbor	31	29	Dec. 5	Jan. 22	Feb. 28	Jan. 12	Feb. 6	Mar. 28	Feb. 16	Mar. 8	Apr. 10	Feb. 26	Apr. 7	May 15	75	30	..	..
Rīga (863), open sea	12	12	Dec. 15	Jan. 10	Feb. 2	Mar. 6	Mar. 11	Mar. 16	Mar. 23	Apr. 5	Apr. 17	Mar. 17	Apr. 2	May 3	82	25	..	10
Roomassaare (868)	9	9	Nov. 16	Dec. 15	Jan. 30	...	...	...	...	...	...	Apr. 3	Apr. 24	May 15	133	71	27	..
Ruhnu (867)	28	26	Dec. 15	Jan. 20	Feb. 21	Jan. 15	Feb. 6	Mar. 1	Feb. 6	Mar. 14	Apr. 23	Feb. 23	Apr. 27	May 20	97	36	..	..
Seyskari, (815) Ostrov	35	..	Nov. 25	Dec. 24	Jan. 21	Dec. 20	Jan. 15	Feb. 24	Mar. 2	Apr. 16	May 3	Apr. 10	May 7	May 24	134	91	..	..
Seyvyaste (Seivästö) (809)	37	..	Nov. 24	Dec. 15	Jan. 17	Dec. 15	Jan. 3	Jan. 19	Mar. 22	Apr. 22	May 15	Apr. 11	May 8	May 26	144	109	..	..
Soēla Väin (849)	11	11	Nov. 17	Dec. 10	Jan. 30	...	...	...	...	...	...	Mar. 20	Apr. 16	May 5	115	64	23	..
Sõrve Nina (871)	30	30	Nov. 23	Jan. 10	Mar. 14	Dec. 17	Feb. 2	Feb. 24	Feb. 16	Mar. 17	Apr. 26	Jan. 31	Apr. 10	May 24	90	43	..	..
Suur Katel (870)	..	..	...	...	...	...	Dec. 31	...	...	Mar. 1	...	...	...	...	..	60	..	..
Suurupi (834)	12	10	Jan. 7	Feb. 5	Mar. 17	...	...	...	...	...	...	Feb. 23	Mar. 23	Apr. 30	46	0	..	12
Tahkuna (843)	38	37	Dec. 2	Jan. 12	Mar. 21	...	...	...	...	...	...	Feb. 6	Apr. 1	May 15	79	..	..	..
Tallinn (832)	28	25	Dec. 21	Jan. 22	Mar. 12	Jan. 11	Feb. 7	Mar. 1	Feb. 27	Mar. 24	Apr. 17	Feb. 6	Apr. 8	May 14	76	45	..	..
Tolbukhin Mayak (814)	42	42	Nov. 3	Nov. 27	Jan. 10	Nov. 26	Dec. 19	Mar. 13	Mar. 17	Apr. 20	May 14	Apr. 7	May 5	May 24	189	122	..	..
Trongsund (803)	16	16	Nov. 14	Dec. 3	Dec. 29	Dec. 16	Jan. 11	Feb. 14	Mar. 3	Apr. 19	May 19	Mar. 5	Apr. 26	May 16	144	98	..	0
Vaindlo (824)	40	..	Dec. 5	Jan. 17	Mar. 17	Jan. 10	Feb. 10	Mar. 5	Mar. 1	Mar. 24	Apr. 18	Mar. 19	Apr. 27	May 27	100	42	..	..
Ventspils (876), harbor	18	16	Dec. 15	Jan. 14	Feb. 10	...	...	...	...	...	...	Dec. 28	Apr. 14	Apr. 13	23	0	..	..
Ventspils (876), open sea	17	13	Dec. 16	Jan. 26	Mar. 3	...	...	...	...	...	...	Feb. 16	Apr. 13	Apr. 17	24	0	..	..

[redacted] Original

Location	Number of years of record	Number of years with ice	Date of appearance of ice: Earliest	Date of appearance of ice: Average	Date of appearance of ice: Latest	Date of closing of navigation: Earliest	Date of closing of navigation: Average	Date of closing of navigation: Latest	Date of opening of navigation: Earliest	Date of opening of navigation: Average	Date of opening of navigation: Latest	Date of disappearance of ice: Earliest	Date of disappearance of ice: Average	Date of disappearance of ice: Latest	Average annual number of days with ice	Average annual number of days closed to navigation	Average maximum thickness of ice	Number of years of record navigation maintained throughout winter
Vilsandi (854)	16	16	Jan. 12	Jan. 10	Feb. 28	...	...	...	...	...	...	Jan. 16	Feb. 28	Apr. 11	49	0	..	..
Võilaid (858)	33	30	Nov. 21	Dec. 19	Feb. 1	Nov. 27	Jan. 4	Feb. 12	Feb. 13	Apr. 6	Apr. 30	Mar. 27	Apr. 26	May 15	128	92	..	..
Vormsi (846), SW coast	11	11	Nov. 13	Dec. 22	Mar. 14	...	...	...	...	...	...	Apr. 8	Apr. 24	May 10	123	85	14	..
Vormsi (846), N coast	42	42	Oct. 25	Dec. 12	Feb. 2	Nov. 27	Jan. 6	Feb. 15	Feb. 10	Apr. 1	Apr. 29	Mar. 20	Apr. 22	May 26	131	85	..	..
Vyborg (802)	17	17	Oct. 23	Nov. 26	Jan. 7	Dec. 15	Jan. 10	Feb. 28	Mar. 3	Apr. 20	May 18	Mar. 30	Apr. 28	May 15	153	100	..	0

PART C: SOUTH COASTAL SECTOR

Location	Number of years of record	Number of years with ice	Date of appearance of ice: Earliest	Date of appearance of ice: Average	Date of appearance of ice: Latest	Date of closing of navigation: Earliest	Date of closing of navigation: Average	Date of closing of navigation: Latest	Date of opening of navigation: Earliest	Date of opening of navigation: Average	Date of opening of navigation: Latest	Date of disappearance of ice: Earliest	Date of disappearance of ice: Average	Date of disappearance of ice: Latest	Average annual number of days with ice	Average annual number of days closed to navigation	Average maximum thickness of ice	Number of years of record navigation maintained throughout winter
Adzhigiol (910	8	..	Nov. 21 (1931) *	Dec. 9	Dec. 20 (1931) *	...	...	...	...	...	...	Feb. 19 (1925) *	Mar. 22	Apr. 8 (1932) *	103	..	..	
Azov (961)	11	..	Nov. 2 (1920) *	Nov. 27	Dec. 16 (1923) *	...	...	...	...	...	...	Feb. 24 (1914) *	Mar. 19	Apr. 7 (1918) *	112	..	..	.
Belosarayskaya Kosa (954)	7	7	Nov. 20	Dec. 16	Dec. 30	Dec. 20	Jan. 1	Jan. 25	Mar. 4	Mar. 24	Apr. 15	Mar. 22	Apr. 3	Apr. 30	108	82	..	0
Biryuchiy, Ostrov (949), open sea	7	7	Nov. 26	Dec. 22	Jan. 15	Dec. 23	Dec. 30	Jan. 17	Mar. 3	Mar. 23	Apr. 13	Mar. 7	Apr. 2	Apr. 28	101	83	..	2
Bol'shoy Fontan, Mys (902)	10	..	Jan. 11 (1926) *	Jan. 23	Feb. 10 (1923) *	...	**	...	...	**	...	Feb. 21 (1931) *	Mar. 12	Mar. 28 (1928) *	30	..	.	..
Dnestrovsko-Tsare-gradskiy Mayak (903)	26	..	Nov. 6 (1907) *	Dec. 8	Jan. 9 (1911) *	...	...	...	...	...	...	Feb. 23 (1908) *	Mar. 7	Mar. 30 (1907) *	89	..	..	..
Dzharylgachskiy, Zaliv (922)	17		Nov. 20 (1931) *	Dec. 28	Feb. 16 (1918) *	...	...	...	...	...	...	Jan. 12 (1910) *	Mar. 9	Apr. 2 (1929) *	61	..	..	..
Dzharylgachskiy, Zaliv (922), offing	14	..	Dec. 1 (1931) *	Jan. 3	Jan. 21 (1914) *	...	...	...	...	...	...	Jan. 12 (1910) *	Mar. 7	Mar. 27 (1932) *	49	..	..	..
Feodosiya (935)	6	..	...	Feb. 3	...	...	**	...	...	**	...	...	Feb. 22	...	5	..	..	..
Genichesk (947)	44	..	Nov. 10 (1897) *	Dec. 17	Feb. 21	...	...	...	...	...	...	Feb. 20 (1925) *	Mar. 24	May 2	80	..	..	..
Kasperovka (915)	7	..	Nov. 27 (1931) *	Dec. 10	Dec. 23 (1928) *	...	...	...	...	...	...	Mar. 12 (1930) *	Mar. 25	Apr. 6 (1929) *	99	..	..	..
Kazantip, Mys (943)	6	6	Nov. 30	Dec. 23	Jan. 18	Jan. 1	Jan. 24	...	...	Mar. 20	Apr. 6	Mar. 15	Apr. 2	Apr. 25	100	55	..	3
Kerch' (939)	29	..	Dec. 13 (1921) *	Jan. 6	Feb. 21 (1902) *	...	††	...	...	††	...	Jan. 11 (1910) *	Feb. 27	Mar. 31 (1909) *	36			
Khersonesskiy, Mys (932)	9	9	Nov. 21	Dec. 14	Dec. 27	Dec. 8	Dec. 24	...	...	Mar. 18	Mar. 27	Mar. 3	Mar. 25	Apr. 5	101	84	12"–14"	3
Khoryl (924)	9	9	Nov. 22	Dec. 15	Dec. 24	...	††	...	...	††	...	Mar. 1	Mar. 19	Apr. 3	94	..	..	5
Kyz-Aul, Mys (937)	8	..	Jan. 26 (1927) *	Feb. 9	Feb. 24 (1930) *	...	**	...	...	**	...	Feb. 1 (1927) *	Feb. 27	Mar. 30 (1928) *	7	..	..	..

* Year of occurrence of absolute extreme indicated in parentheses.
** Ice does not normally close ordinary navigation during winter.
†† Navigation generally maintained throughout winter with ice breakers.

PART C: SOUTH COASTAL SECTOR *(Continued)*

Location	Number of years of record	Number of years with ice	Date of appearance of ice: Earliest	Date of appearance of ice: Average	Date of appearance of ice: Latest	Date of closing of navigation: Earliest	Date of closing of navigation: Average	Date of closing of navigation: Latest	Date of opening of navigation: Earliest	Date of opening of navigation: Average	Date of opening of navigation: Latest	Date of disappearance of ice: Earliest	Date of disappearance of ice: Average	Date of disappearance of ice: Latest	Average annual number of days with ice	Average annual number of days closed to navigation	Average maximum thickness of ice	Number of years of record navigation maintained throughout winter
Mariupol' (955)	19	..	Nov. 25 (1868) *	Dec. 9	Jan. 3 (1875) *	...	...	...	...	...	...	Mar. 6 (1870) *	Mar. 24	Apr. 10 (1875) *	105	..	..	0
Nikolayev (912)	35	..	Nov. 11 (1908) *	Dec. 14	Jan. 20 (1920) *	...	...	...	...	...	...	Jan. 7 (1895) *	Mar. 14	Apr. 17 (1929) *	92	..	12"-14"	..
Ochakovskaya, Kosa	31	..	Nov. 16 (1908) *	Dec. 14	Feb. 21 (1902) *	...	...	...	...	...	...	Feb. 10 (1892) *	Mar. 13	Apr. 19 (1929) *	78	..	..	..
Odessa (905)	33	..	Dec. 1 (1931) *	Jan. 4	Feb. 10 (1923) *	...	...	...	...	...	...	Jan. 9 (1909) *	Mar. 1	Apr. 1 (1928) *	37	..	..	..
Odessa (905), offing	26	.	Dec. 20 (1899) *	Jan. 15	Feb. 22	...	..	...	...	...	...	Jan. 22 (1897) *	Feb. 24	Mar. 28 (1928) *	40	..	..	..
Osipenko (953)	7	7	Nov. 19	Dec. 16	Jan. 1	Dec. 22	Jan. 7	Jan. 27	Mar. 2	Mar. 23	Apr. 14	Mar. 15	Apr. 2	Apr. 30	107	75	..	0
Osipenko, Nizhniy Berdyanskiy Mayak (953)	35	..	Nov. 15 (1908) *	Dec. 25	Jan. 10 (1899) *	...	...	...	...	...	...	Feb. 18 (1904) *	Mar. 24	Apr. 19 (1889) *	89	..	..	..
Rostov-na-Donu (959)	23		Nov. 16 (1873) *	Dec. 8	Jan. 3 (1875) *	...	...	...	...	...	...	Feb. 24 (1879) *	Mar. 25	Apr. 7 (1875) *	107	..	..	..
Sevastopol' (931)	..	..	...	†	...	...	...	...	...	...	...	...	†	...	..	..	..	..
Skadovsk (923)	9	9	Nov. 21	Dec. 14	Dec. 23	Dec. 18	Jan. 9	Jan. 20	Feb. 17	Mar. 7	Mar. 20	Mar. 6	Mar. 22	Apr. 4	99	57	..	2
Stanislav (914)	7	..	Nov. 26 (1931) *	Dec. 11	Dec. 24 (1928) *	...	...	...	...	...	...	Mar. 12 (1930) *	Mar. 26	Apr. 10 (1929) *	105	..	..	..
Sulina (902)	7	5	Dec. 20	Jan. 7	...	...	††	...	...	††	...	...	Feb. 17	Mar. 20	42	..	..	3
Svyatotroitskaya (913)	24	..	Nov. 17 (1927) *	Dec. 12	Jan. 8 (1913) *	...	...	...	...	...	...	Feb. 12 (1916) *	Mar. 18	Apr. 19 (1929) *	84	..	..	..
Taganrog (958)	48	..	Nov. 1 (1916) *	Dec. 1	Dec. 16 (1892) *	...	...	...	...	...	...	Mar. 4 (1914) *	Mar. 27	Apr. 17 (1896) *	113	..	..	..
Tarkhankut, Mys (927)	8	..	Feb. 1 (1929) *	Feb. 2	Feb. 7 (1938) *	...	...	...	...	...	...	Feb. 15 (1910) *	Feb. 25	Mar. 3 (1928) *	8	..	..	..
Tendrovskiy, Zaliv (921)	9	..	Dec. 8 (1927) *	Jan. 8	Feb. 9 (1923) *	...	...	...	...	...	...	Jan. 27 (1925) *	Mar. 12	Apr. 7 (1932) *	56	..	..	..
Tendrovskiy, Zaliv (921), open sea	7	6	Dec. 15	Jan. 17	Feb. 5	...	**	...	...	**	...	Feb. 10	Mar. 8	Apr. 2	50	..	..	7
Yenikale (942)	7	7	Nov. 30	Dec. 25	Jan. 25	...	††	...	...	††	...	Mar. 6	Apr. 1	Apr. 22	96	..	..	4
Yevpatoriya (928)	9	6	Dec. 30	Jan. 25	...	...	**	...	...	**	...	Mar. 10	Mar. 1	...	35	..	..	9

* Year of occurrence of absolute extreme indicated in parentheses.
** Ice does not normally close ordinary navigation during winter.
† Port normally ice-free throughout year.
†† Navigation generally maintained throughout winter with ice breakers.

TABLE III - 14

BOTTOM SEDIMENTS

Locality	Description
NORTH COASTAL SECTOR	
Lat. 69°20′ N, long. 65° E, W around Novaya Zemlya (2)	
Baydaratskaya Guba (20) to Proliv Yugorskiy Shar (23)	Very little information. Possibly patches of *rock* in *mud* and *sand and mud*. Offshore patchy—*mud* and *clay* with *rocky* patches.
Proliv Yugorskiy Shar (23)	
Approaches	*Sand* and *clay*.
Strait proper	Largely *sand* with patches of *rock*, although still some *clay*.
Close in off both shores	Probably *sand* with patches of *rock*, *stone*, and *clay*.
Karskoye More (18)	
Offshore in	*Mud*, *sand and mud*, and *clay*.
Novaya Zemlya (2)	
E coast of	No information, but possibly *rock* near shore, especially off numerous headlands and around islands, with *mud* probable between rocky areas.
W coast of, to Proliv Karskiye Vorota (6)	*Mud* with numerous *rock* and *stone* patches close inshore; offshore *mud*. *Rock* general off headlands.
Proliv Kostin Shar (14)	*Mud* and *sand and mud*.
Guba Belush'ya (16)	Patches of *rock* and *stone* near shore; *mud* in central parts.
Guba Chernaya (12)	Patches of *rock* and *sand* near shore; *mud* in central parts.
Proliv Karskiye Vorota (6)	
SW approaches and central portions	*Mud* and *sand and mud*. Rock along either shore, probably with *sand and mud* between *rocky* areas.
Karskoye More (18), near Proliv Karskiye Vorota (6)	No information, but probably *mud* and *sand and mud*.
Proliv Karskiye Vorota (6) to Beloye More (109), entrance	
Proliv Karskiye Vorota (6) to Ostrov Kolguyev (46)	Little information. Probably *sand* and *sand and mud* with occasional patches of *stone*.
Ostrov Kolguyev (46) to mainland	*Sand* and *sand and mud* with occasional *stony* patches.
Chëshskaya Guba (49)	*Sand* and *sand and mud* with occasional *stony* patches.
Around Poluostrov Kanin (54) as far as Mys Kanin Nos (55)	*Sand* and *sand and mud* with occasional patches of *stone*.
Ostrov Kolguyev (46) and Poluostrov Kanin (54), outside of	Generally *sand* with occasional patches of *sand and mud* and *stone* offshore for 60 to 120 miles.
Entrance to Beloye More (109), seaward of	Generally *sand* with occasional patches of *sand and mud* and *stone*.
Beloye More (White Sea) (109)	
Immediate entrance	Generally *sand*.
Eastern channel	*Sand* with occasional patches of *sand and mud* and *stone*.
Central channel	*Sand* with patches of *rock*.
Western channel	Generally *sand*.
Shoals between channels, other scattered shoals	*Sand*, *rock*, and *stone*.
Central part	*Mud* offshore.
Ostrov Morzhovets (82)	
Around island and between island and shore	*Stone*.

TABLE III - 14 (Continued)

Locality	Description
Bank to N and NW	Generally *stone*.
Mezenskaya Guba (65)	Patchy—*rock*, *sand*, and *stone* probably becoming *sandier* near shore.
Mezen' (68), up	Patchy, but probably largely *sand*.
Gorlo (257)	Generally *stone* and *rock* becoming *sandy* approaching the southeastern shore except for occasional *stone* banks. *Rock* with patches of *sand* and *stone* along northwestern shore.
Dvinskaya Guba (108)	
Central parts of	Generally *mud* with occasional patches of *sand* and *rock*.
The Severnaya Dvina (105)	
Off mouths of	*Sand* and *sand and mud*.
Up mouths of	Largely *sand*.
Mouths of the Severnaya Dvina (105) to Unskaya Guba (113)	*Mud* and *sand and mud* along shore, becoming *sandier* near shore and *muddier* offshore.
Unskaya Guba (113)	
Approaches to	Numerous patches of *rock*.
Unskaya Guba (113) to Mys Letniy Orlov (131)	Patchy—*mud*, *rocks*, and *stone*, becoming *rock* near shore, particularly off headlands, and *muddy* offshore.
Onezhskaya Guba (132) Western approach to	
Central parts	*Mud*.
Between Mys Letniy Orlov (131) and Ostrov Solovetskiy (120)	*Sand* and *stone*.
S of Ostrov Solovetskiy (120)	*Sand* and *stone*.
Onezhskaya Guba (132)	
Central parts	Generally *sand* and *sand and mud*, continuing along northeast shore with occasional *stony* and *rocky* patches.
Onega (143), bay	Generally *sand* and *sand and mud* with occasional patches of *stone* and *rock* becoming *sand* and *sand and mud* near shore.
Onega (town) (143), roads	*Sand* and *sand and mud*.
Onezhskiye Reyd (road)	
Numerous small islands and shoals, particularly along southwest side	*Rock* in immediate vicinity, with *sand* or *sand and mud* in deeper water.
Ostrov Bol'shoy Zhuzhmuy (161) north of	Generally *rock* and *stone* with occasional *mud* and *sand* patches.
Eastern approach to Onezhskaya Guba (132), between Ostrov Solovetskiy (120) and the mainland	Generally *rock* and *stone* with occasional patches of *mud* and *sand*.
Ostrov Solovetskiy (120) to Mys Shaparov (190)	Very *rocky* near shore, probably with *sand* or *sand and mud*, between ledges, becoming *sand and mud* and *mud* with patches of *stone* and *rock* offshore.
Kandalakshskaya Guba (189)	
Approaches to	*Mud* across to opposite shore.
Central part	*Mud*.
Numerous bays and estuaries bordering this gulf	Little information, but probably largely *rock* with *mud* in deeper portion near shore between ledges; *mud* in central parts.

TABLE III - 14 (Continued)

Locality	Description
Guba Keret' (195), Guba Kovda (207), Guba Zapadnaya Por'ya (228), and Guba Sosnovaya (240)	Largely *rock* with *mud* in deeper portions near shore between ledges; *mud* in central parts.
Mys Turiy (243) to Mys Kamennyy (250)	Numerous patches of *rock* immediately off beach; *mud* and *sand and mud* near shore becoming *mud* offshore.
Mys Bol'shoy Gorodetskiy (274) to the Finnish border	
Mys Bol'shoy Gorodetskiy (274) to Guba Vostochnaya Litsa (296)	Little information. Near shore probably largely *sand* with *stone*, and *rock* patches becoming *rockier* immediately off the shoreline, especially off the headlands, and *sandier* in deep water seaward.
Guba Vostochnaya Litsa (296) to Ostrov Kil'din (314)	Patchy—*rock* and *sand* in strip 5 to 10 miles off coast.
Semiostrovskiy Reyd (297)	Patchy—*rock* and *sand*.
Guba Rynda (300)	Patchy—*rock* and *sand*.
Guba Podpakhta (305)	Patchy—*rock* and *sand*.
Guba Voron'ya (308)	Patchy—*rock* and *sand*.
Guba Teriberskaya (309)	Patchy—*rock* and *sand*.
Other bays along this coast	Probably patchy with *rock* and *sand* bottoms.
Kol'skiy Zaliv (340)	
Off approaches	Numerous *rock* ledges near shore; *mud* offshore in deeper parts.
Inlet (340)	*Mud* and *sand and mud* in deeper parts; numerous patches of *rock* near shore.
Approaching Murmansk (325)	*Sand* and *mud* and perhaps *sand* in deeper parts; numerous patches of *rock* near shore.
Above Murmansk (325) to Kola (326)	*Sand*, *rock*, and *stone* with occasional patches of *sand and mud*.
Ostrov Kil'din (314) to Poluostrov Rybachiy (362)	Chiefly *mud* in deeper portions, becoming patchy with *mud*, *rock*, and *sand* near shore. Probably largely *rock* immediately off all shorelines. *Mud* extends into numerous inlets.
Motovskiy Zaliv (352) including its small tributary bays	*Mud*, with *rock* immediately off shoreline.
Poluostrov Rybachiy (362) along seaward side of, and in small bays	Patchy—*rock*, *sand*, *stone*, and a little *mud*.
Poluostrov Sredniy (372), around	Patchy—*rock*, *sand*, *stone*, and a little *mud*.
Barents Sea (1), entire offshore area of	Patchy—*stone*, *sand*, and *sand and mud*, becoming somewhat *muddier* to the westward.
WEST COASTAL SECTOR	
Vyborgskiy Zaliv (805) to Narva Laht (821)	
Vyborgskiy Zaliv (805)	Patchy—*mud*, *rock*, and *sand*.
Bays in shoreline	Patchy—*mud*, *rock*, and *sand*, becoming somewhat *sandier* in bays along northwest side.
Channels to Vyborg (Viipuri) (802)	Patchy—*mud*, *rock*, and *sand*.
Sounds and estuaries on eastern side	Patchy—somewhat *muddy*, but with areas of *rock* and *sand*.
Entrance, from Ostrov Tiurinsari (806) and Ostrov Koyvisto (807) to head of Gulf of Finland (801)	*Rock* with patches of *sand* and *mud* in northeastern part; *sand* and *sand and mud* in central and southwestern part.

TABLE III - 14 (Continued)

Locality	Description
Head of Gulf of Finland (801) northern side, from Ostrov Koyvisto (807) to longitude 29° 30′ E.	*Mud* with some patches of *sand* and *sand and mud*.
Kronshtadt (813), north and south of	Entirely *sand* to shoreline.
Nevskaya Guba (812), to mouths of the Neva at Leningrad (811)	Entirely *sand* to both shores.
Head of Gulf of Finland (801), south shore, from Kronshtadt (813) to headlands of Koporskaya Guba (817)	Nearshore patches of *sand*, *rock*, and *stone* becoming *sand* and *sand and mud* toward center of gulf.
Headlands to Koporskaya Guba (817)	Patches of *sand*, *rock*, *stone* and *sand and mud*.
Koporskaya Guba (817)	Probably largely *sand* and *mud* with patches of *stone* and *rock*.
Koporskaya Guba (817) to Luzhskaya Guba (818)	*Sand* and *rock* extending offshore in series of shoals to *sand* and *sand and mud* in center of gulf.
Luzhskaya Guba (818)	*Sand* and *sand and mud* with numerous *stony* and *rocky* shoals.
Luzhskaya Guba (818) to Narva Laht (821)	Patchy—*rock*, *sand*, and *stone* extending offshore in series of shoals and small islands to the *mud* and *sand and mud* in center part of gulf.
Narva Laht (821) to Paldiski Laht (839)	
Narva Laht (821)	*Sand and mud* and *mud* close inshore becomes *muddier* in central part of gulf; numerous patches of *rock* along shore; particularly off headlands and their outer shores and around the numerous small islands.
West central part	Principally *sand* inshore with patches of *rock* chiefly in vicinity of islands and shoals. Becomes *muddier* offshore, being *mud* and *sand and mud* in central gulf.
Off Mahu (823)	Principally *sand* but some *sand and mud* and patches of *rock*.
Small bays such as Käsmu Laht (826), Eru Laht (827), Hara Laht (828), Kolga Laht (829), Tallinna Laht (833), and Paldiski Laht (839)	*Sand and mud* and *mud* in central part of bays. Some of these bays are *sandy* in the shoal water at their heads.
Paldiski Laht (839) to Gulf of Riga (866)	
Paldiski Laht (839) west along seaward side of islands bounding Gulf of Riga (866) on the north	*Mud* restricted to deeper, offshore parts of gulf.
Vaike-Pakri Saar (840)	*Rock* with patches of *sand* on seaward side; *sand* between island and mainland.
Suur-Pakri Saar (837)	*Rock* with patches of *sand* on seaward side; *sand* between island and mainland.
Between the Pakri (840 and 837) islands and Ostrov Osmussaar (838)	Little information, but probably *sand* and *rock*, becoming *rockier* off headlands and in vicinity of numerous islands and shoals, and *sandier* in open stretches and in central parts of small bays.
Sound between Vormsi (846) and mainland	*Sand* or *sand and mud* in channels; shoals of *stone*, *rock*, or *sand*.

TABLE III - 14 (Continued)

Locality	Description
North of Hiiumaa (845) and Vormsi (846)	*Sand* and *stone* with numerous areas of *rock* extend seaward in series of shoals and banks to *muds* in central gulf.
Sound between Hiiumaa (845) and Vormsi (846)	*Sand* or *sand and mud* in channels; shoals of *stone, rock,* or *sand.*
Bay between Vormsi (846) and Muhu (852)	*Mud* and *sand and mud* in deeper parts. Shoals of *stone, sand,* and *rock.*
Kassaare Laht (850)	*Mud* and *sand and mud* in deeper parts.
Hiiumaa (845), western side of	Patchy—*sand, stone,* and *rock. Rock* particularly prevalent in vicinity of numerous outlying shoals and banks.
Matsalu Laht (848) and similar bays on mainland side	Probably largely *sand and mud.* Shoals of *stone, sand,* and *rock.*
Muhu Väin (853) to head of Gulf of Riga (866)	*Sand and mud.*
Gulf of Riga (866), entering head of	Patches of *sand* and *stones.*
Saaremaa (856), northwestern and western coasts of	Patchy—*sand, stone,* and *rock,* becoming somewhat *muddier* toward the south. Little information available, but probable that *sand and mud* in numerous bays indenting the western coast. *Rock* particularly prevalent in vicinity of numerous outlying shoals and banks. *Mud* in central parts of gulf off these coastal areas.
Gulf of Riga (866)	
Entrance to (vicinity of shoals across Irbeni Väin, 873)	Little information, but probably *stone* and *rock* in vicinity of shoals, becoming *muddier* in deeper water inside entrance.
Central parts	Patchy—*mud, sand and mud, sand,* and *stone.*
Off southeast coasts of Saaremaa (856), Muhu (852), across Muhu Väin (853) and southeast as far as Kihnu (861)	*Sand* and *stone,* probably with considerable *rock* along the broken shoreline, particularly off the headlands. *Mud* may occur in the more protected area of the numerous small bays.
Pärnu Laht (860)	*Sand and mud* in central part, probably becoming *sandy* nearer shore. Approaching the shore are numerous patches of *stone* becoming *rocky* off the immediate shore.
Pärnu Laht (860) to Rīga (863) and northwest to Kolkasrags (872)	Generally *sand* with occasional *stone* and *rock* patches, becoming *muddier* toward central part of Gulf. *Sand* extends to shoreline along most of this stretch except locally off headlands where there are patches of *rock.*
Rīga (863)	*Sand* extends to shoreline.
Mērsrags (865)	Patches of *rock.*
Kolkasrags (872), off	Apparently entirely *sand.*
Gulf of Riga (866) to Provisional Boundary (54°23′ N, 19°50′E)	
Kolkasrags (872) to Liepāja (878)	Information along this coast generalized.
Kolkasrags (872) to Ovisi (875)	Probably *sand* along shore, with possible occasional patches of *stone.*
Ovisi (875) to Ventspils (876)	Generally *sand* along shore; *sand* and *stone* patches near shore becoming *mud* in deeper parts.

TABLE III - 14 (Continued)

Locality	Description
Ventspils (876) past Akmenrags (877) to Liepāja (878)	Possibly *sand* immediately off shoreline; very *stony* near shore, becoming *sandier* offshore before becoming *muddy* in deeper parts.
Liepāja (878), off	Patchy—*stone, rock, sand* and *clay.*
Liepāja (878) to Klaipėda (880)	Possibly generally *sandy* off the immediate shoreline. Patchy, broken bottom of *stone,* and *sand,* and *rock* extending about 20 to 25 miles seaward grading into *sand* and *mud and sand* in central parts of the sea.
Klaipėda (880) to Mys Bryusterort (Brüster Ort) (884)	
Immediate approaches to Klaipėda (880) and for some 30 miles south of Klaipėda (880)	*Sand* to shoreline.
Point 30 miles south of Klaipėda (880) to Mys Bryusterort (884)	Probably *sand* immediately off shoreline; *sand* and *stone* near shore with occasional patches of *clay.*
Kurisches Haff (882)	
Northern half	Generally *sand* with a little *sand and mud.*
Southern half	*Sandy clay.*
Mys Bryusterort (Brüster Ort) (884) to Baltiysk (Pillau) (885)	Near shore, probably *stone* with patches of *sand* for about first six miles, rest *sand. Stone* with patches of *sand* 4 to 6 miles offshore along northern half.
Approaches to Baltiysk (885)	Generally *sand* 5 to 8 miles offshore.
Baltiysk (885) to boundary	*Sand* near shore narrowing to 2 miles in width south to boundary.
Gulf of Danzig (887), central part	*Clay.*
Frisches Haff (888)	*Sand and mud.*
SOUTH COASTAL SECTOR	
Mouth of the Danube (902) to Tendrovskiy Zaliv (921)	
Off mouth of the Danube (902)	*Sand and mud* with patches of *sand* near shore; offshore, *sand and mud* and *mud* across the width of the shelf for 60 miles to the 100 fathom curve.
Mouth of the Danube (902) to Dnestrovsko-Tsaregradskiy Mayak (903)	*Sand* from shoreline to about 20 miles offshore, thereafter *sand and mud* and *mud.*
Dnestrovsko - Tsaregradskiy Mayak (903) to Odessa (905)	*Sand* with *rock* patches immediately offshore, becoming *sand and mud* and *mud* seaward within ½ mile of shore.
Off Odessa (905)	*Sand* within 1 mile of shore becoming *sand and mud* offshore. *Rock* patches over *sand* bottom in northeast portion.
Odessa (905) to Dneproyskiy Liman (918)	*Sand* immediately off the beach becoming *sand and mud* near shore.
Odesskaya Banka (906)	*Sand* becoming *mud* along the southern side.
Berezanskaya Zapadnaya Kosa (907)	*Rock* patches offshore.
Approaches to the Dnepr (917) and Ostrov Berezan' (908)	Near shore *sand and mud* with *rocky* patches off the entrances; *sand* offshore.
Berezanskiy Liman (908)	*Mud,* probably becoming *sandier* near shore.

TABLE III - 14 (Continued)

Locality	Description
Mys Ochakovskiy (909)	*Sand* immediately offshore.
Estuary of the Yuzhnyy Bug (911)	*Mud* and *sand and mud* in central parts becoming *sandier* off both shores.
Dneprovskiy Liman (918)	*Sand* immediately offshore becoming *mud* in central parts.
Kinburnskaya Kosa (919)	*Sand* immediately offshore.
Approaches to Yegorlytskiy Zaliv (920) and Tendrovskiy Zaliv (921)	Patches of *sand* and *sand and mud*.
Yegorlytskiy Zaliv (920)	*Sand and mud* probably reaching most of the shoreline.
Tendrovskiy Zaliv (921)	*Mud* reaching shoreline.
Tendrovskiy Zaliv (921) to Sevastopol' (931)	
Tendrovskiy Zaliv (921) to longitude 32° E	*Sand* immediately along the beach, becoming patchy *sand* and *sand and mud* in a narrow zone offshore, with *sand* seaward of this zone changing to *sand and mud* in deeper water.
Longitude 32° E to Karkinitskiy Zaliv (925)	*Sand* near shore reaching the shoreline; offshore *sand and mud*.
Approaches to Karkinitskiy Zaliv (925)	*Sand;* also *sandy* off spit forming western side.
Karkinitskiy Zaliv (925)	*Sandy* to shoreline. Occasional *rock* or *stone* patches.
Dzharylgachskiy Zaliv (922)	*Mud.*
Karkinitskiy Zaliv (925) to Bukhta Karadzhanskaya (926)	*Sand* near shore, probably with patches of *rock* and *stone*. *Sand and mud* offshore.
Bukhta Karadzhinskaya (926)	*Sand* extending to the beach at the head of the bay. *Rock* patches off both headlands, particularly the southern.
Bukhta Karadzhinskaya (926) to Yevpatoriya (928)	Generally *sand* near shore with patches of *stone; mud* offshore.
Kalamitskiy Zaliv (929)	*Sand* near shore; *sand and mud* in central parts. *Sandier* in southern part than in the northern. Patches of *rock* off headlands at northern and southern ends of bay.
Yevpatoriya (928) road	*Sand* with *rock* patches.
Mys Lukull (930) to Sevastopol' (931)	*Sand and mud* and *mud* with *rock* patches becoming *mud* offshore.
Approaches to Sevastopol' (931)	Patches of *sand* and *stone* with occasional *rock* patches near shore.
Sevastopol' (931) harbor inside entrance	*Mud* becoming *sandy* near shore.
Sevastopol' (931) to Kerchenskiy Proliv (938)	
Sevastopol' (931) to Mys Khersonesskiy (932)	*Mud* becoming *rock* near shore; probably *mud* in deeper part of small bays.
Mys Kersonesskiy (932) to Feodosiyskiy Zaliv (936)	*Mud* becoming *rock* near shore with scattered *sand* areas in open bights. Information is generalized to a great extent.
Feodosiyskiy Zaliv (936)	*Mud* and *sand and mud* becoming *sand* near shore except off headlands. Scattered patches of *rock* throughout.
Feodosiyskiy Zaliv (936) to Kerchenskiy Proliv (938)	*Sand and mud* becoming *rock* near shore off headlands. Probably *sand* in open bights.
Kerchenskiy Proliv (938)	
Approaches to	*Sand* and *sand and mud* becoming *sand* near shoreline except for *rock* off small headlands.
Strait south of Yenikale (942)	*Sand.*
Kosa Tuzla, (940)	
Approaches to and entrance off	*Sand.*
Northeast of	*Sand and mud* becoming *sand* off the beach.
Kerch' (939) roads	*Sand and mud* becoming sand along shore.
Yenikale (942) reach	*Sand and mud.*
Strait north of Yenikale (942)	*Sand and mud.*
Kosa Chushka (941)	*Sand* offshore.
Bay south of	*Sand and mud.*
Azovskoye More (945)	
Central Part	*Mud.*
Kerchenskiy Proliv (938) to Arabat (944)	*Mud* probably becoming *sand and mud* near shore. Probably *rock* off headlands and cliffs.
Arabat (944) to Genichesk (947)	*Sand* along shore, *mud* offshore.
Genichesk (947), beach south of	*Sand and mud* close into beach.
Utlyukskiy Liman (948)	*Sand and mud* becoming *sand* to the east.
Ostrov Biryuchiy (949), approaching	*Sand.*
Genichesk (947) to Kosa Obitochnaya (951)	*Mud* and *sand and mud* coming close inshore. Probably *sand* immediately off most of shoreline except for probable patches of *stone* and *rock* off cliffs.
Kosa Obitochnaya (951)	*Sand.*
Otmel' Kosy Obitochnoy (952)	*Sand.*
Berdyanskiy (953) Reyd	*Sand* near shore, becoming *sand and mud* in central parts.
Osipenko (953) to Kosa Krivaya (957)	Probably *sand* immediately near shoreline; otherwise *mud*.
Kosa Krivaya (957) to Taganrog (958)	*Sand* along shoreline, particularly off spit with *sand and mud,* and *sand* in central parts of gulf.
Taganrog (958), head of gulf off	Generally *sand* with a little *sand and mud*. *Sand* probably reaches shore.
Taganrog (958) to 47° N, 39° E	Generally *sand* with a little *sand and mud*. *Sand* probably reaches shore.

37. PRINCIPAL SOURCES

A. Evaluation

Some of the data for this report were obtained from German, British, Russian, and Finnish sources, and some from the U.S. Navy Hydrographic Office and the U.S. Coast and Geodetic Survey.

Data were adequate except for sea and swell conditions, bioluminescence of the North and West Coastal Sectors, and color of the South Coastal Sector.

B. List of references

1. Antipa, G.
   La Vie dans la Mer Noire (Life in the Black Sea). Annales Inst. ocean., n. s., vol. 13, pp. 51-90. 1933.
2. Buch, Kurt.
   Hydrografisk-Kemiska Studier uti Petsamo-Fjorden Jämte Angränsände Delar av Barentshavet (Hydrographic-Chemical Studies in Petsamo Fjord and the Neighboring Regions of the Barents Sea). Fennia, vol. 57, No. 4. 29 pp. 1933.

3. Derjugin, K. M.
Das Barentsmeer Langs dem Kola-Meridian (The Barents Sea along the Kola Meridian). Intle. Rev. d. ges. Hydrobiol. u. Hydrogr., vol. 12, pp. 145-175. 1924.

4. ———
Barentsogo More po Kol'skomu Meridianu (33°30' v.d.) (The Barents Sea along the Kola Meridian). Trudy Severnoi Nauch. — Promysl. Eksped., vol. 19. 102 pp., illus., tables, diagrs. 1924.

5. ———
Die Fauna des Weissen Meeres und ihre Existenzbedingungen (The Fauna of the White Sea and the Conditions of their Existence). Issled. Mor. SSSR, 7/8. 511 pp., charts. 1928.

6. ———
Ozeanographische Forschungen im Weissen Meere (Oceanographic Research in the White Sea). Arktis, vol. 3, pp. 6-13. 1930.

7. Dorsey, N. E.
Properties of Ordinary Water-Substance in all its Phases: Water-Vapor, Water, and all the Ices. xxiv, 673 pp. New York, Reinhold Publishing Corporation. 1940.

8. Finland, Merentutkimuslaitos.
Regular Observations of Temperature and Salinity in the Seas Around Finland, 1921-1939/40. Merentutkimuslaitoksen Julkaisu, Nos. 5, 16, 20, 26, 34, 38, 45, 51, 58, 65, 75, 82, 88, 92, 100, 105, 109, 122, 126, 129, 135. 1921-1945.

9. Gavrilescu, N. and Popovici, Z.
Ergebnisse der Untersuchungsfahrten mit dem S. M. Schiff "Constantza" der Kgl. Rum. Marine im Schwarzen Meer in den Jahren 1934 und 1935 (Results of the Research Voyage with the "Constantza" of the Royal Romanian Navy in the Black Sea during 1934 and 1935). Ann. Acad. Romania, 1936, ser. 3, vol. 12, pp. 85-115. 1937.

10. Gehrke, J.
Über Farbe und Durchsichtigkeit des Ostseewassers (On the Color and Transparency of Baltic Sea Waters). Int. Coun. for the Study of the Sea, Pub. de Circ., No. 45. 20 pp. 1909.

11. Germany, Oberkommando der Kriegsmarine.
Die Naturverhältnisse des Sibirischen Seeweges. Aufl. 2 (Natural History of the Siberian Sea Route. Ed. 2). M. Dv. Nr. 900. viii, 277 pp., illus., plates, charts. Berlin. 1941.

12. ———
Ostsee-Handbuch, Mittlerer Teil (Baltic Pilot, Middle Part). Ed. 7. xxxvi, 392 pp. Berlin, E. S. Mittler & Sohn. 1942.

13. ———
Schwarzes und Asowsches Meer: Geographische Übersicht, Klima, und Wetter, Eisverhältnisse, Oberflächenströmungen, Tiefenwasser und Tiefenströmung, Wassertemperatur, Salzgehalt, Dichte des Meerwassers, Schifffahrtswege, Missweisung (Black and Azov Seas: Geographical Summary of the Climate, Weather, Ice, Surface Currents, Deep Water and Currents, Water Temperature, Salinity, Density, and Sea Routes). Nr. 2033 Beiheft. 72 pp., illus. 1943.

14. Great Britain, Admiralty, Hydrographic Department.
Hydrographical Remarks on the White Sea in the Summer of 1854. By Captain Ommanney. 29 pp. 1855.

15. ———
Baltic Pilot, vol. 3. Comprising the Gulf of Finland, the Aland Islands, the Aland Sea, and the Gulf of Bothnia. Ed. 2, 411 pp. 1925.

16. ———
Arctic Pilot, vol. 1. Comprising the Coasts of Finland, and the U.S.S.R. from Jakobselv in Europe to Cape Severni (North) in Asia, including the White Sea, Novaya Zemlya, Franz Josef Land, the Gulfs and Rivers of Ob' and Yenisei. Ed. 4, 625 pp. 1933.

17. ———
The Admiralty Tide Tables 1938, pt. II, 232 pp. 1937.

18. ———
Supplement No. 1, 1942, to Admiralty Tide Tables 1938, pt. II, 23 pp. 1941.

19. ———
Black Sea Pilot. Comprising the Dardanelles, Sea of Marmara, Bosporus, Black Sea, and Sea of Azov. Ed. 9, 453 pp. 1942.

20. ———
Tide Tables for the Year 1946, sec. A, Home Waters, pts. I-II, 276 and 69 pp. 1945.

21. ———
Supplement No. 2, 1945, Relating to the Black Sea Pilot. Ed. 9, 10 pp. 1945.

22. Great Britain, Meteorological Office.
Weather in Home Waters and the North-Eastern Atlantic, vol. 2, pt. 7, The Norwegian and Barents Seas. M.O. 446b(7). 196 pp., illus. 1941.

23. ———
Weather in Home Waters and the North-Eastern Atlantic, vol. 2, pt. 6, The Baltic Sea. M.O. 446b(6). 204 pp., illus. 1943.

24. Gripenberg, Stina.
Sediments of the Baltic Sea. In Recent Marine Sediments; a Symposium, pp. 298-321, illus. 1939.

25. International Geodetic and Geophysical Union, Association of Physical Oceanography.
Monthly and Annual Mean Heights of Sea Level up to and including the Year 1936. Pub. Sci. 5, 255 pp. 1940.

26. International Hydrographic Bureau.
Tides, Harmonic Constants. Spec. Pub. 26. Monaco. 1939.

27. Kalle, Kurt.
Fluoreszenz und Gelbstoffgehalt im Bottnischen und Finnischen Meerbusen (Fluorescence and Yellow Substance Content in the Gulfs of Bothnia and Finland). German Hydrographic Institute, Unpublished Scientific Report, No. 28. 9 pp., illus. Unpublished manuscript.

28. Knipovich, N. M.
Wissenschaftlichen Fischerei-Expedition im Asowschen und Schwarzen Meer, Lief. 10, Hydrologie und Hydrobiologie des Schwarzen Meeres (Scientific Fishery Expedition to the Azov and Black Seas, pt. 10, Hydrology and Hydrobiology of the Black Sea). Moscow. 1933.

29. Lisitzin, Eugenie.
Die Gezeiten des Finnischen Meerbusens (Tides of the Finnish Gulf). Fennia, vol. 68, No. 2, 19 pp. 1944.

30. Orleans, L. P. R., Duc De.
Campagne Arctique de 1907. Journal de Bord et Physique du Globe (Arctic Campaign of 1907. Ship's Log and Physics of the Earth). 99 pp., illus. Brussels. 1911.

31. Protopopov, I. D.
Neskol'ko Dannykh o Gidrologicheskom Rezhime Ust'ya R. Mezeni (Some Data on the Hydrological Regime of the Mezen River Mouth). Issled. Mor. SSSR, 16, pp. 87-122, illus. 1932.

32. Rossolimo, A. J.
K Gidrologii Barentsova Moria Pechorskoe More (On the Hydrography of the Sea of Barents, Petchora Sea). Trud. Morsk. Nauchn. Inst., vol. 3, No. 1, pp. 1-100. 1928.

33. Ruppin, E.
Die Hydrographie des Barentsmeeres im Sommer 1913 (Hydrography of the Sea of Barents in the Summer of 1913). Wiss. Meeresunter., n. f., abt. Helgoland, vol. 13, No. 1, pp. 47-94. 1919.

34. Scripps Institution of Oceanography, La Jolla.
On Wave Heights in Straits and Sounds where Incoming Waves Meet a Strong Tidal Current. Wave Project Report 11, 4 pp. Unpublished manuscript.

35. Sivertsen, Erling.
On the Biology of the Harp Seal Phoca groenlandica Erxl. Investigations Carried Out in the White Sea 1925-1937. Hvalradets Skrifter, nr. 26, 166 pp., illus. 1941.

36. Stetson, H. C.
Bottom Characteristics off European Coasts of Russia. 16 pp. Unpublished manuscript. 1946. (Confidential)

37. Suvorov, E. K.
Gidrologicheskie i Gidrograficheskie Raboty Cheshskoy Ekspeditsii 1926 Goda (Hydrological and Hydrographic Work of the Expedition to Cheshkaya Bay in 1926). Trud. Inst. Izuch. Sev., vol. 43, pp. 30-57, illus. 1929.

38. U. S. Department of Commerce, Coast and Geodetic Survey.
TIDES AND CURRENTS OF THE EASTERN MEDITERRANEAN, THE AEGEAN AND WESTERN BLACK SEA. Rept. 17. 33 pp. Unpublished manuscript. (Confidential)

39. ———
TIDE TABLES, ATLANTIC OCEAN, 1947. 352 pp. 1946.

40. ———
TIDES AND CURRENTS OF U.S.S.R. Rept. 71. 73 pp. Unpublished manuscript. (Confidential)

41. U. S. Department of Commerce, Weather Bureau.
STATE OF SEA TABULATIONS FOR THE BLACK SEA. Prep. from Moscow Daily Meteorological Bulletin, 1932-1937. Unpublished manuscript.

42. U. S. Navy Department, Hydrographic Office.
ARCTIC PILOT, VOL. 1. H. O. 137. 358 pp. 1917.

43. ———
BLACK SEA PILOT. THE DARDANELLES, SEA OF MARMARA, BOSPORUS, BLACK SEA, AND THE SEA OF AZOV. Ed. 2. H. O. 155. 474 pp. 1926.

44. ———
BALTIC PILOT, VOL. 1. THE BALTIC SEA FROM FALSTERBO POINT AND CAPE ARKONA TO THE ENTRANCES OF THE GULFS OF FINLAND AND BOTHNIA. Ed. 3. H. O. 142. 432 pp. 1930.

45. ———
SAILING DIRECTIONS FOR THE BALTIC, VOL. 3. THE GULF OF FINLAND, THE ALAND ISLANDS, AND THE GULF OF BOTHNIA. Ed. 2. H. O. 143. 385 pp. 1934.

46. ———
BREAKERS AND SURF; PRINCIPLES IN FORECASTING. H. O. 234. vii, 54 pp. 1944.

47. ———
WIND WAVES AND SWELL; PRINCIPLES IN FORECASTING. H. O. Misc. 11,275. 61 pp. 1944.

48. ———
1945 RESTRICTED SUPPLEMENT TO HYDROGRAPHIC OFFICE PUBLICATION NO. 142, BALTIC PILOT, VOL. 1. 55 pp. 1945.

49. ———
1945 RESTRICTED SUPPLEMENT TO HYDROGRAPHIC OFFICE PUBLICATION NO. 143, SAILING DIRECTIONS FOR THE BALTIC, VOL. 3. 31 pp. 1945.

50. U.S.S.R. Gidrograficheskoe Upravlenie.
LOTSIYA KARSKOGO MORYA CHAST' I, KARSKOE MORE I NOVAYA ZEMLYA (Kara Sea Pilot, pt. I, Kara Sea and Novaya Zemlya). 546 pp. Leningrad. 1938.

51. ———
LOTSIYA BARENTSOVA MORYA. CHAST' III, YUGO-VOSTOCHNAYA CHAST' (Barents Sea Pilot, pt. III, Southeastern Part). 173 pp. 1939.

52. ———
LOTSIYA BELOGO MORYA (White Sea Pilot). 464 pp. 1939.

53. ———
LOTSIYA BARENTSOVA MORYA. CHAST' II, MURMANSKII BEREG (Barents Sea Pilot, pt. II, Murman Coast). 464 pp. 1941.

54. U.S.S.R. Gidrograficheskoe Upravlenie, Gidro-Meteorologicheskii Sluzhby.
BIDRO-METEOROLOGICHESKIYA NABLIUDENIYA GIDROGRAFICHESKIKH EKSPEDITSII (Hylrometeorological Observations of Hydrographic Expeditions). Vols. 3-7. 1923-1927.

55. U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby.
TABLITSY EZHEGODNYKH VYSOT UROVNYA MORYA DLIA EKATERININSKOY GAVANI, 1944 (Tide Tables for Ekaterininskaya Harbor). 15 pp. 1943.

56. ———
TABLITSY PRILIVOV VODY EVROPESKOY CHAST' SSSR I SEVERNAYA CHAST' ATLANTICHESKOGO OKEANA, CHAST' I (Tide Tables for The European Russian Waters and the North Atlantic Ocean, pt. I). 109 pp. Moscow. 1943.

57. ———
TABLITSY VREMEN I VYSOT POLNYKH I MALYKH VOD NA 1944 G. BELOE MORE (Tide Tables for the White Sea, 1944). 112 pp. 1944.

58. ———
TABLITSY PRILIVOV, TOM I, VUP. I, CHAST' II, 1944 (Tide Tables, vol. I, pt. II, Waters of the U.S.S.R. and Adjacent Waters, 1944). 76 pp. 1943.

59. U.S.S.R. Upravlenie Morskikh Sil (RKKA), Gidrograficheskii Otdel.
TIDE TABLES FOR THE ARCTIC OCEAN, 1937. 70 pp. 1936.

60. Vasnetsov, V. A.
GIDROLOGICHESKII OCHERK CHESKSKOY GUBY PO MATERYALAM 10-I EKSPEDITSII MORSKOGO NAUCHNOGO INSTITUTA (Hydrographic Description of Cheshkaya Bay from the Material of the 10th Expedition of the Marine Scientific Institute). Trud. Morskoy Nauchn. Inst., vol. 4, No. 2, pp. 69-86. 1929.

61. Witting, Rolf.
DAS LICHT IM MEERE MIT BESONDERER BEACHTUNG DES NORDLICHEN TEILS DES BALTISCHEN MEERES (Transparency of Seawater with Special Reference to the Northern Part of the Baltic Sea). Acta Finsk. Veten. Soc., n. s., A, vol. 3, No. 9. 56 pp., illus. 1944.

MAPS AND CHARTS

62. Deutsche Seewarte, Hamburg.
ATLAS DER DICHTE DES MEERWASSERS, LIEF. 9, SCHWARZES MEER, LIEF. 10, WEISSES MEER UND MURMANKÜSTE, LIEF. 13, NORDMEER UND BARENTSSEE (Atlas of Seawater Density, pt. 9, Black Sea, pt. 10, White Sea and Murman Coast, pt. 13, Arctic Ocean and Barents Sea). Nr. 2210. Hamburg, Oberkommando der Kriegsmarine. 193?.

63. ———
ATLAS DER EISVERHÄLTNISSE IM DEUTSCHEN UND BENACHBARTEN OSTUND NORDSEEGEBIET (Ice Atlas of the German and Neighboring Regions in the Baltic and North Seas). Nr. 2198. 10 pp., 31 charts. 1942.

64. ———
ATLAS DER VEREISUNGSVERHÄLTNISSE RUSSLANDS UND FINNLANDS, IHRER KÜSTENGEWASSER SOWIE WIRTSCHAFTLICH UND MILITÄRISCH WICHTIGEN BINNENWASSERSTRASSEN MIT TEXTLICHEN VORBEMERKUNGEN UND TABELLEN (Ice Atlas of Russian and Finnish Coastal Waters as well as their Inland Waters of Economic and Military Importance). Nr. 2197. 20 pp., 94 charts. 1942.

65. ———
ATLAS DER BODENBESCHAFFENHEIT DES MEERES, LIEF. 4, SÜDLICHE OSTSEE, LIEF 8, MITTLERE OSTSEE, FINNISCHER MEERBUSEN, BOTTNISCHER MEERBUSEN, LIEF 10, WEISSES MEER UND KOLA-BUCHT (Atlas of Oceanic Bottom Sediments, pt. 4, Southern Baltic, pt. 8, Middle Baltic, Finnish Gulf, Gulf of Bothnia, pt. 10, White Sea and Kola Bay). Nr. 2310. Berlin, Oberkommando der Kriegsmarine. 194?.

66. Great Britain, Admiralty, Hydrographic Department.
TIDAL STREAMS IN WHITE SEA, Nov. 1942, with Corrections for Jan. 1944. H. D. 371. 13 charts. 1942.

67. ———
Various charts.

68. Great Britain, Meteorological Office, Marine Division.
MONTHLY METEOROLOGICAL CHARTS OF THE ATLANTIC OCEAN. M.O.M. 402 a. Atlas of 48 sheets. 1943.

69. Maksimov, I. V.
ATLAS PRILIVO-OTLIVNYKH I POSTOYANNYKH TECHENII V PROLIVE KARSKIE VOROTA (Atlas of Tidal and Nontidal Currents in the Strait of Kara Entrance). 99 pp. Leningrad, Glavsevmorputi. 1937.

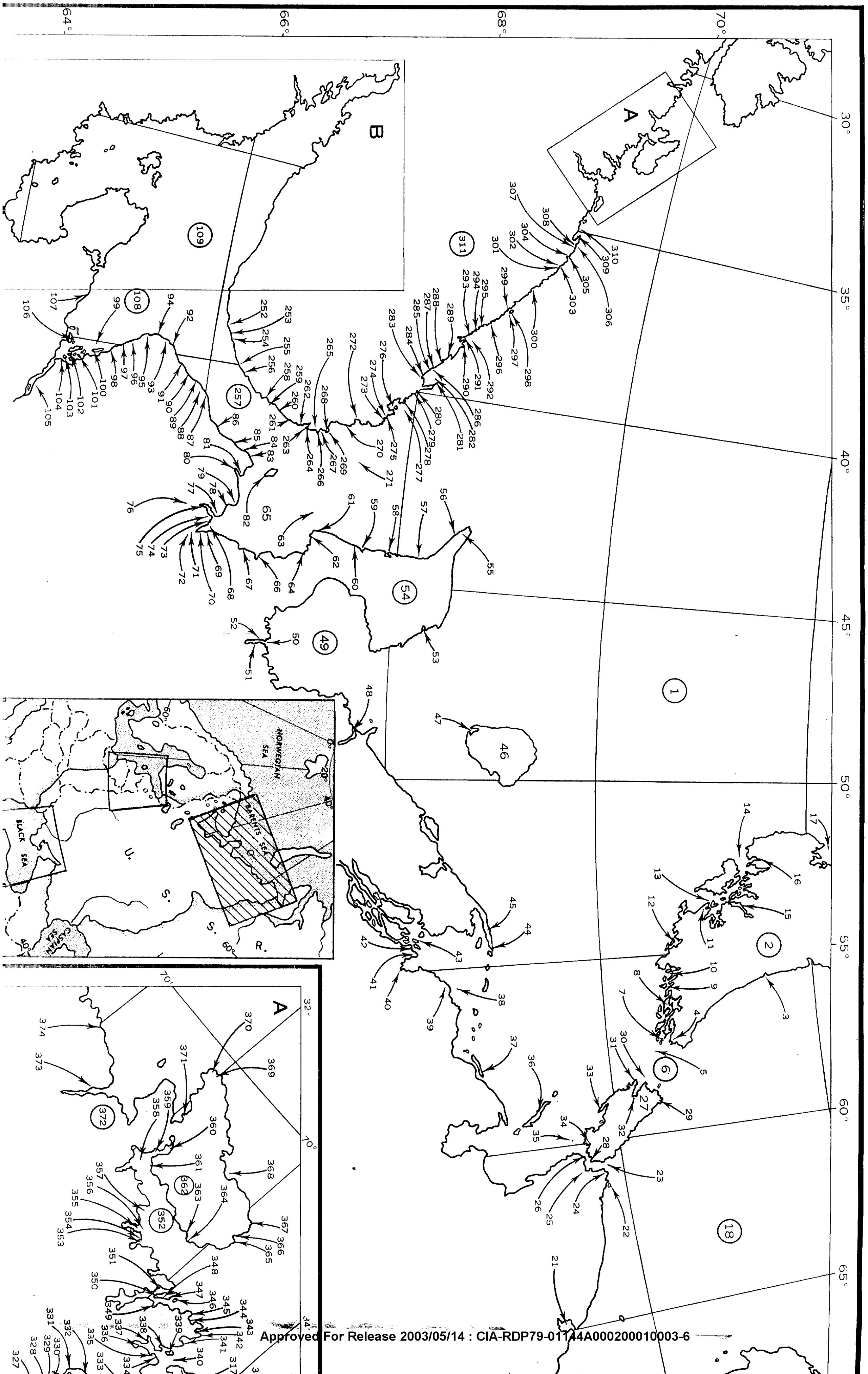
70. U. S. Army Map Service.
VARIOUS A.A.F. AERONAUTICAL CHARTS.

71. U. S. Navy Department, Hydrographic Office.
ICE ATLAS OF THE NORTHERN HEMISPHERE. H. O. 550. 106 pp. 1946.

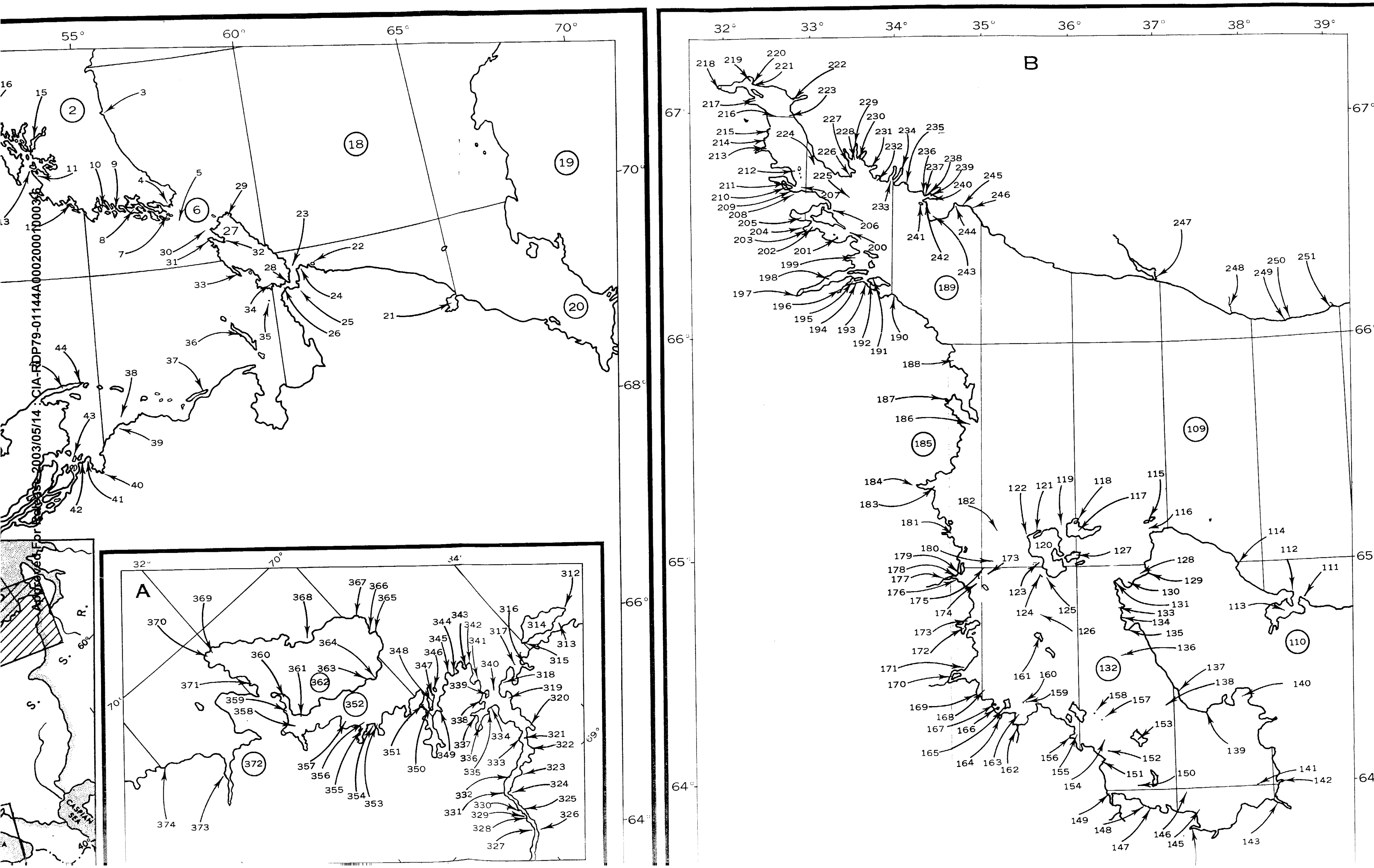
72. ———
VARIOUS CHARTS.

73. U.S.S.R. Gidrograficheskoe Upravlenie.
ATLAS PRILIVO-OTLIVNYKH TECHENII BELOGO MORYA (Atlas of Tidal Currents of the White Sea). No. 1027. 12 charts. 1940.

page 1 of 4



LOCATION MAP
JANIS 40
CONFIDENTIAL



page 2 of 4

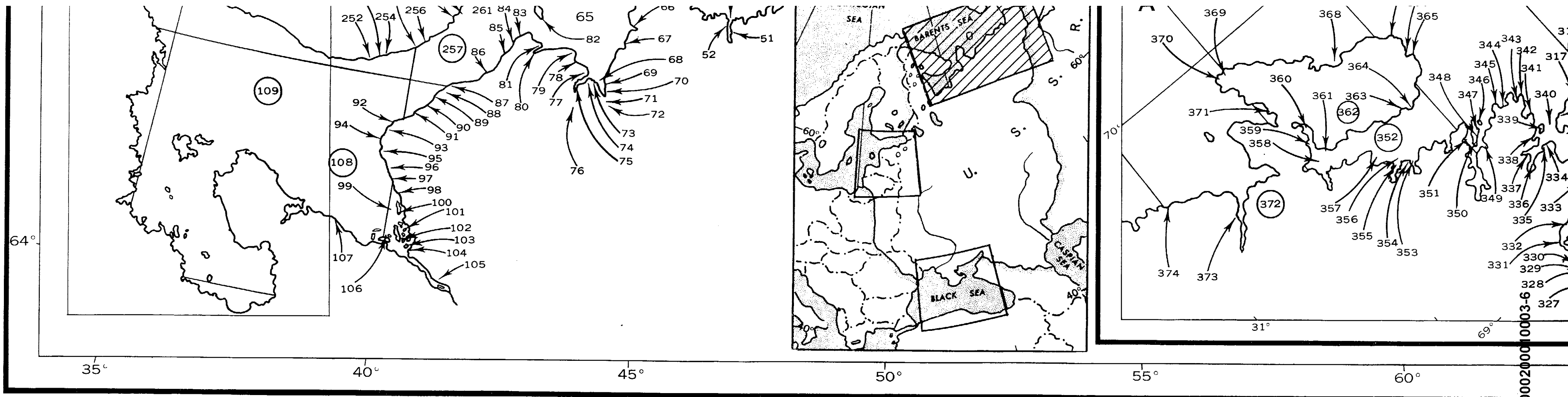


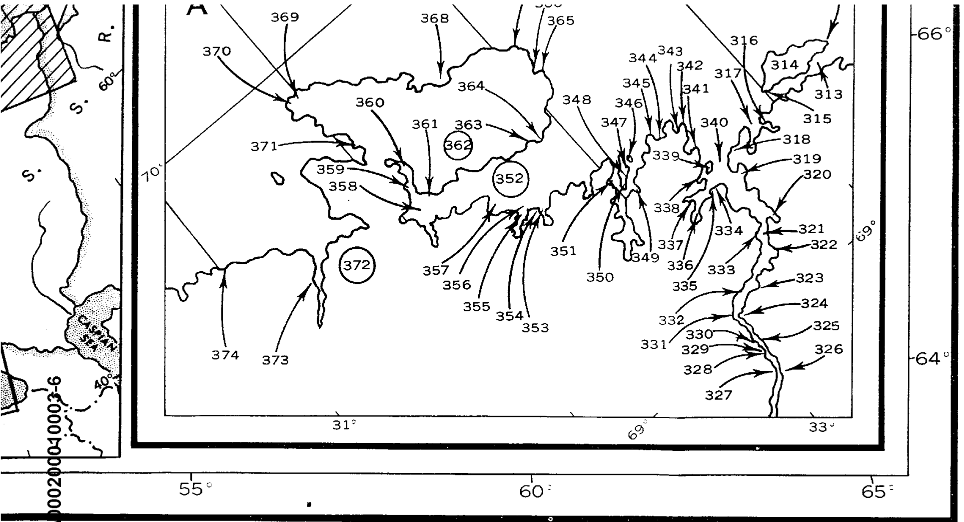
FIGURE III - 51. *Location map: North Coastal Sector.* Names of places indicated by numbers are given in the accompanying list. These numbers appear in parentheses after the place names throughout the text.

KEY TO FIGURE III - 51

1. Barents Sea
2. Novaya Zemlya
3. Savvina
4. Guba Kamenka
5. Banka Persey
6. Proliv Karskiye Vorota
7. Ostrov Bol'shoy Loginov
8. Ostrov Kusova Zemlya
9. Petukhovskiy Shar
10. Guba Sakhanikha, Guba Rakhmanova
11. Guba Propashchaya
12. Guba Chernaya
13. Ostrov Kruglyy
14. Proliv Kostin Shar
15. Ozero Nekhvatovo Pervoye
16. Guba Belush'ya
17. Zaliv Mollera
18. Karskoye More
19. Poluostrov Yamal
20. Baydaratskaya Guba
21. Karskaya Guba
22. Ostrov Mestnyy
23. Proliv Yugorskiy Shar
24. Proliv Yugorskiy Shar, radio station, east entrance
25. Khabarovo
26. Proliv Yugorskiy Shar, narrows
27. Ostrov Vaygach
28. Mys Peschanyy
29. Mys Bolvanskiy Nos
30. Ostrov Voronov
31. Mys Rogatyy
32. Guba Dolgaya
33. Mys Bol'shoy Lyamchin Nos
34. Guba Varneka
35. Ostrov Matveyev
36. Ostrov Dolgoiy
37. Ostrov Varandey
38. Aleksandrovskaya Mel'
39. Mys Konstantinovskiy
40. Bolvanskaya Guba
41. Mys Bolvanskiy Nos
42. Ostrov Zelenyy
43. Pechora, bar
44. Gulyayevskiye Koshki
45. Mys Russkiy Zavorot
46. Ostrov Kolguyev
47. Bugrino
48. Indiga
49. Chëshskaya Guba
50. Pesha
51. Zemlyanichni
52. Yegorova
53. Kambal'nitsa
54. Poluostrov Kanin
55. Mys Kanin Nos
56. Tarkhanovo
57. Bol'shaya Bugryanitsa
58. Shoyna
59. Kiya
60. Mys Lagyshev
61. Mys Konushin
62. Konushinskaya Zavod'
63. Banka Litke
64. Chizha
65. Mezenskaya Guba
66. Nes'
67. Nizhnyaya Mgla
68. Mezen'
69. Semzha
70. Pyya
71. Kamenka
72. Mezen'
73. Mys Apovskiy
74. Mys Kargovskiy
75. Kuloy
76. Dolgoshchel'ye
77. Mys Nerninskiy
78. Nizha
79. Mys Abramov
80. Koyda
81. Yurovatyy
82. Ostrov Morzhovets
83. Mys Voronov
84. Bol'shaya Kedovka
85. Mayda
86. Megra
87. Ruch'i
88. Mys Intsy and Bol'shiye Intsy
89. Mys Medvezhiy
90. Tova
91. Zolotitsa
92. Mys Veprevskiy
93. Mys Lysunov
94. Mys Zimnegorskiy
95. Mys Kerets
96. Malyye Kozly
97. Reka Bol'shiye Kozly
98. Reka Kuya
99. Berezovyy Bar
100. Ostrov Mud'yugskiy
101. Ostrov Lapominka
102. Novodvinskaya Krepost'
103. Ostrova Solombal'skiye
104. Arkhangel'sk
105. Severnaya Dvina
106. Nikol'skoye Ust'ye, bar
107. Syuz'ma
108. Dvinskaya Guba
109. Beloye More
110. Letniy Bereg
111. Mys Krasnogorskiy Rog
112. Mys Yarengskiy Rog
113. Unskaya Guba
114. Lopshenga
115. Ostrov Zhizhginskiy
116. Zhizhginskaya Salma
117. Ostrov Anzerskiy
118. Guba Troitskaya
119. Anzerskaya Salma
120. Ostrov Solovetskiy
121. Sosnovaya Tonya
122. Mys Perech'-Navolok
123. Zaliv Solovetskiy
124. Ostrova Zayatskiye
125. Zaiatskaia Vorota
126. Ostrova Sennukhi
127. Ostrov Bol'shaya Muksalma
128. Guba Letnyaya Zolotitsa
129. Letnyaya Zolotitsa
130. Guba Konyukhova
131. Mys Letniy Orlov
132. Onezhskaya Guba
133. Guba Pushlakhta
134. Mys Tonkiy
135. Mys Chesmenskiy
136. Gryaznogubskiy Stamik
137. Lyamtsy
138. Lyamitskiye Stamiki
139. Mys Glubokiy
140. Guba Ukhta
141. Ostrov Kiy
142. Pil'Yema
143. Onega
144. Kushereka
145. Ostrov Paskanets
146. Ostrov Nyapa
147. Unezhma (river)
148. Guba Unezhma
149. Nyukhcha
150. Ostrov Malaya Korepalka
151. Mys Ponomarev Nos
152. Ostrov Parusnitsna
153. Ostrov Kondostrov
154. Onezhskiye Shkhery
155. Kolezhma
156. Kolezhma (river)
157. Ostrov Berezhenoy Borshovets
158. Ostrov Golomyannyy
159. Bol'shoy Sed-Ostrov
160. Ostrov Razostrov
161. Ostrov Bol'shoy Zhuzhmuy
162. Suma
163. Sumskaya Guba
164. Vir'ma
165. Ostrov Sumostrov
166. Vir'ma Guba
167. Ostrov Molchanov
168. Guba Kuz
169. Kuz (river)
170. Bol'shoy Sorokskiy Reyd
171. Shuyskaya Salma
172. Lukovatyy
173. Ostrov Nemetskiy Kuzov
174. Kemskiye Shkhery
175. Ostrova Rombaki
176. Kem'
177. Kem' (river)
178. Kemskaya Guba
179. Kemskaya Salma
180. Ostrov Oleshin
181. Guba Letneretskaya
182. Severnyy Kemskiy Stamik
183. Guba Pon'gama
184. Pon'gama (river)
185. Karel'skiy Bereg
186. Guba Kalgalaksha
187. Kalgalaksha
188. Guba Gridina
189. Kandalakshskaya Guba
190. Mys Sharapov
191. Bol'shaya Salma
192. Glubokaya Salma
193. Bol'shaya Salma
194. Ostrov Sredniy
195. Guba Keret'
196. Keret' (river)
197. Plavezhma (river)
198. Guba Chupa
199. Guba Kiv
200. Velikaya Salma
201. Guba Kuzokotskaya
202. Guba Kislaya
203. Ostrov Olenevskiy
204. Chernaya (river)
205. Guba Rugozerskaya
206. Bab'ye More
207. Guba Kovda
208. Kovda (river)
209. Ostrov Ovechiy
210. Ostrov Oleniy
211. Guba Startseva
212. Vachevskaya Salma
213. Guba Knyazhaya
214. Guba Voron'ya
215. Guba Kapshina
216. Kandalakshskiye Shkhery
217. Guba Palkina
218. Guba Kanda
219. Guba Lupcha
220. Niva (river)
221. Kandalaksha
222. Guba Kolvitsa
223. Kibirinskaya Salma
224. Banka Vorob'yeva
225. Ostrova Sredniye Ludy

page 3 of 4

Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6



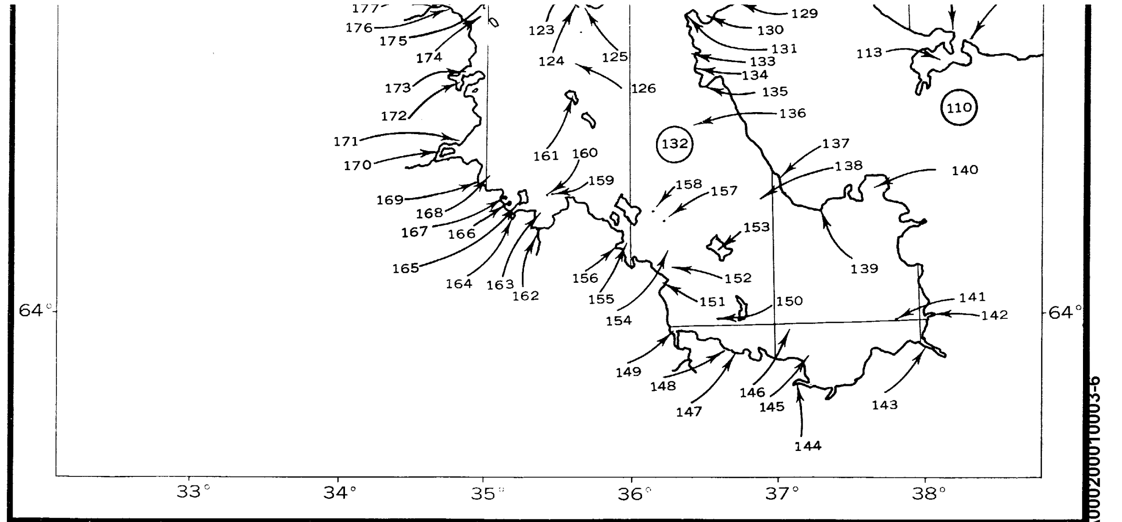


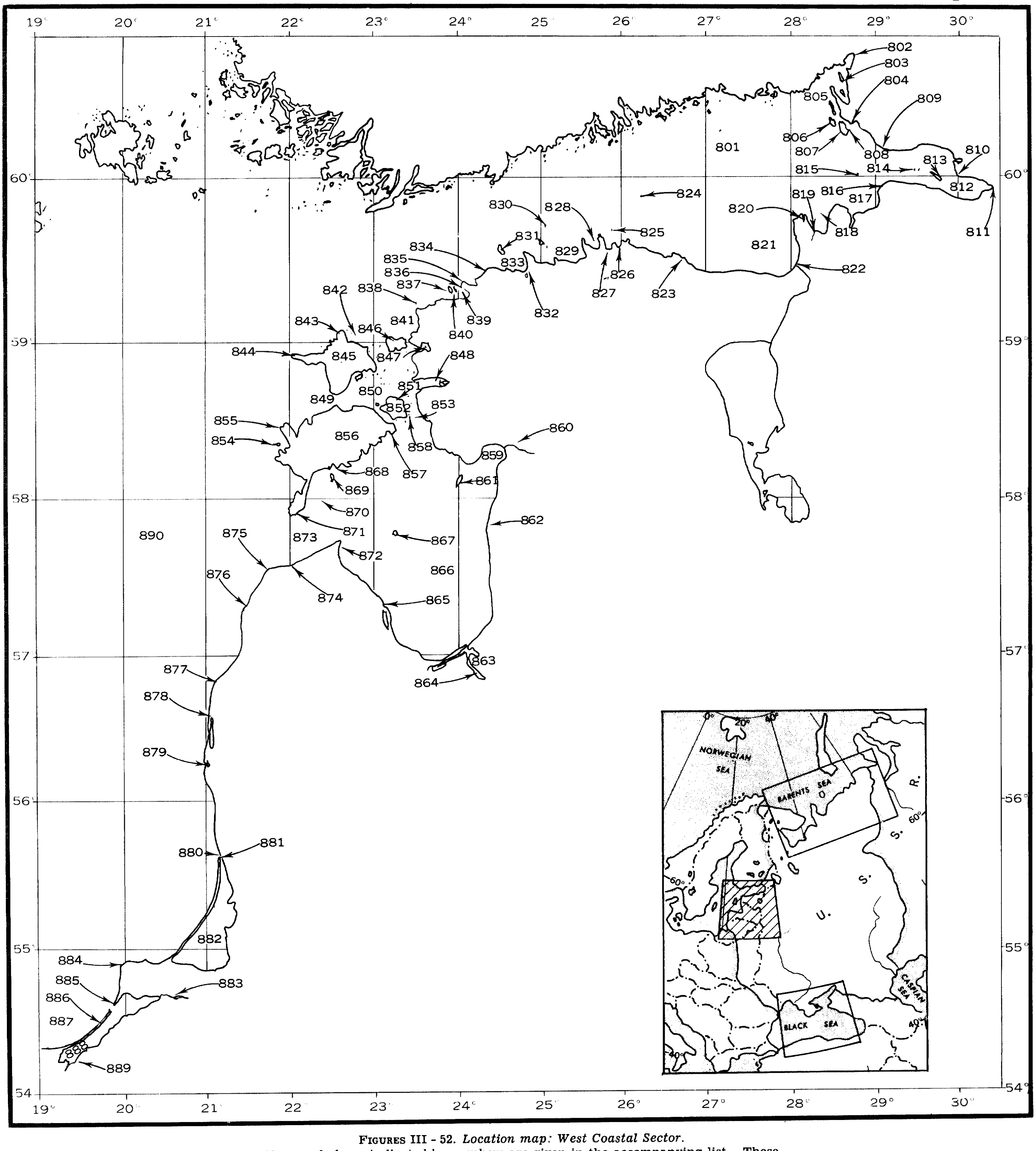
FIGURE III - 51. *Location map: North Coastal Sector.*
Names of places indicated by numbers are given in the accompanying list. These numbers appear in parentheses after the place names throughout the text.

150. Ostrov Malaya Korepalka
151. Mys Ponomarev Nos
152. Ostrov Parusnitsna
153. Ostrov Kondostrov
154. Onezhskiye Shkhery
155. Kolezhma
156. Kolezhma (river)
157. Ostrov Berezhenoy Borshovets
158. Ostrov Golomyannyy
159. Bol'shoy Sed-Ostrov
160. Ostrov Razostrov
161. Ostrov Bol'shoy Zhuzhmuy
162. Suma
163. Sumskaya Guba
164. Vir'ma
165. Ostrov Sumostrov
166. Vir'ma Guba
167. Ostrov Molchanov
168. Guba Kuz
169. Kuz (river)
170. Bol'shoy Sorokskiy Reyd
171. Shuyskaya Salma
172. Lukovatyy
173. Ostrov Nemetskiy Kuzov
174. Kemskiye Shkhery
175. Ostrova Rombaki
176. Kem'
177. Kem' (river)
178. Kemskaya Guba
179. Kemskaya Salma
180. Ostrov Oleshin
181. Guba Letneretskaya
182. Severnyy Kemskiy Stamik
183. Guba Pon'gama
184. Pon'gama (river)
185. Karel'skiy Bereg
186. Guba Kalgalaksha
187. Kalgalaksha
188. Guba Gridina
189. Kandalakshskaya Guba
190. Mys Sharapov
191. Bol'shaya Salma
192. Glubokaya Salma
193. Bol'shaya Salma
194. Ostrov Sredniy
195. Guba Keret'
196. Keret' (river)
197. Plavezhma (river)
198. Guba Chupa
199. Guba Kiv
200. Velikaya Salma
201. Guba Kuzokotskaya
202. Guba Kislaya
203. Ostrov Olenevskiy
204. Chernaya (river)
205. Guba Rugozerskaya
206. Bab'ye More
207. Guba Kovda
208. Kovda (river)
209. Ostrov Ovechiy
210. Ostrov Oleniy
211. Guba Startseva
212. Vachevskaya Salma
213. Guba Knyazhaya
214. Guba Voron'ya
215. Guba Kapshina
216. Kandalakshskiye Shkhery
217. Guba Palkina
218. Guba Kanda
219. Guba Lupcha
220. Niva (river)
221. Kandalaksha
222. Guba Kolvitsa
223. Kibirinskaya Salma
224. Banka Vorob'yeva
225. Ostrova Sredniye Ludy
226. Guba Pedunikha
227. Guba Belozerskaya
228. Guba Zapadnaya Por'ya
229. Guba Shushpanikha
230. Guba Kostarikha
231. Guba Bol'shaya Por'ya
232. Guba Tar
233. Guba Lov
234. Guba Pil'skaya
235. Guba Padan
236. Guba Umba
237. Ust'yanskiy Ostrovok
238. Guba Malaya Pir'ya
239. Guba Bol'shaya Pir'ya
240. Guba Sosnovaya
241. Ostrov Volostrov
242. Mys Chukcherskiy
243. Mys Turiy
244. Chernaya (river)
245. Kuzreka
246. Khlebnaya (river)
247. Varzuga (river)
248. Chavan'ga (river)
249. Tetrino
250. Mys Kamennyy
251. Chapoma (river)
252. Mys Nikodimskiy
253. Chernyavka (river)
254. Pyalitsa (river)
255. Pulonga (river)
256. Likhodeyevka (river)
257. Gorlo
258. Sosnovka (river)
259. Ostrov Sosnovets
260. Guba Krasnyye Ludki
261. Guba Pustaya
262. Mys Krasnyy
263. Ostrova Ponoyskiye Ludki
264. Ponoy (river)
265. Guba Bakalda
266. Ostrov Veshnyak
267. Tri Ostrova
268. Mys Orlov Terskiy Tolstyy
269. Guba Gogolina
270. Mys Kachkovskiy
271. Banka Malaya Panfilovaya
272. Zaliv Kachkovskiy
273. Guba Gorodetskaya
274. Mys Bol'shoy Gorodetskiy
275. Guba Turna
276. Zaliv Lumbovskiy
277. Banka Moriston
278. Mys Krestovoy
279. Guba Startseva
280. Guba Korov'ya
281. Mys Svyatoy Nos
282. Svyatonosskiy Zaliv
283. Iokan'ga (river)
284. Ostrov Zelenyy
285. Ostrov Medvezhiy
286. Guba Gremikha
287. Ostrov Vitte
288. Mys Klyatny
289. Guba Savikha
290. Mys Chernyy
291. Zaliv Vostochnyy Nokuyevskiy
292. Ivanovka (river)
293. Guba Drozdovka
294. Ostrov Kitay
295. Guba Dvorovaya
296. Vostochnaya Litsa (river) and Guba Vostochnaya Litsa
297. Semiostrovskiy Reyd
298. Ostrov Kharlov
299. Kharlovka (river)
300. Guba Rynda
301. Zakhrebetnoye
302. Mys Zapadnyy
303. Guba Porchnikha
304. Guba Zelenetskaya
305. Guba Podpakhta
306. Ostrov Bol'shoy Gavrilovskiy
307. Samoed Channel
308. Voron'ya (river) and Guba Voron'ya
309. Guba Teriberskaya
310. Maloye Olen'ye
311. Murmanskiy Bereg
312. Mys Mogil'nyy
313. Kil'dinskiy Proliv
314. Ostrov Kil'din
315. Mys Byk
316. Guba Dolgaya Zapadnaya
317. Guba Zelenetskaya Zapadnaya
318. Mys Letinskiy
319. Guba Bol'shaya Volokovaya
320. Guba Srednyaya
321. Ostrov Sal'nyy
322. Guba Vayenga
323. Guba Gryaznaya
324. Mys Bazisnyy
325. Murmansk
326. Kola
327. Mys Klev-Navolok
328. Mys Drovyanoy
329. Mys Lagernyy
330. Mys Khaldeyev
331. Mys Mishukov
332. Mys Velikiy
333. Guba Pit'kova
334. Mys Ignat'yeva
335. Yekaterininskaya Gavan'
336. Guba Pala
337. Guba Olen'ya
338. Guba Sayda
339. Ostrov Toros
340. Kol'skiy Zaliv
341. Mys Lodeynyy
342. Mys Set'Navolok
343. Mys Pogan'-Navolok
344. Guba Korelinskaya
345. Mys Voriy
346. Guba Ura
347. Port-Vladimir
348. Ostrovok Mogil'nyy
349. Guba Kislaya
350. Ostrov Shalim
351. Guba Nasha
352. Motovskiy Zaliv
353. Ostrov Bol'shoy Arskiy
354. Guba Ara
355. Guba Vichany
356. Ostrova Vichany
357. Guba Zapadnaya Litsa
358. Guba Titovka
359. Guba Motka
360. Bukhta Ozerko
361. Guba Yeyna
362. Poluostrov Rybachiy
363. Guba Malaya Korabel'naya
364. Mys Sharapov
365. Mys Bashenka
366. Guba Bol'shaya Korabel'naya
367. Mys Tsyp-Navolok
368. Guba Zubovskaya
369. Mys Kekurskiy
370. Guba Vayda
371. Zemlyanoye
372. Poluostrov Sredniy
373. Devkina Zavod'
374. Guba Bazarnaya

page 4 of 4

Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6

FIGURE III-52
LOCATION MAP
JANIS 40
[redacted]

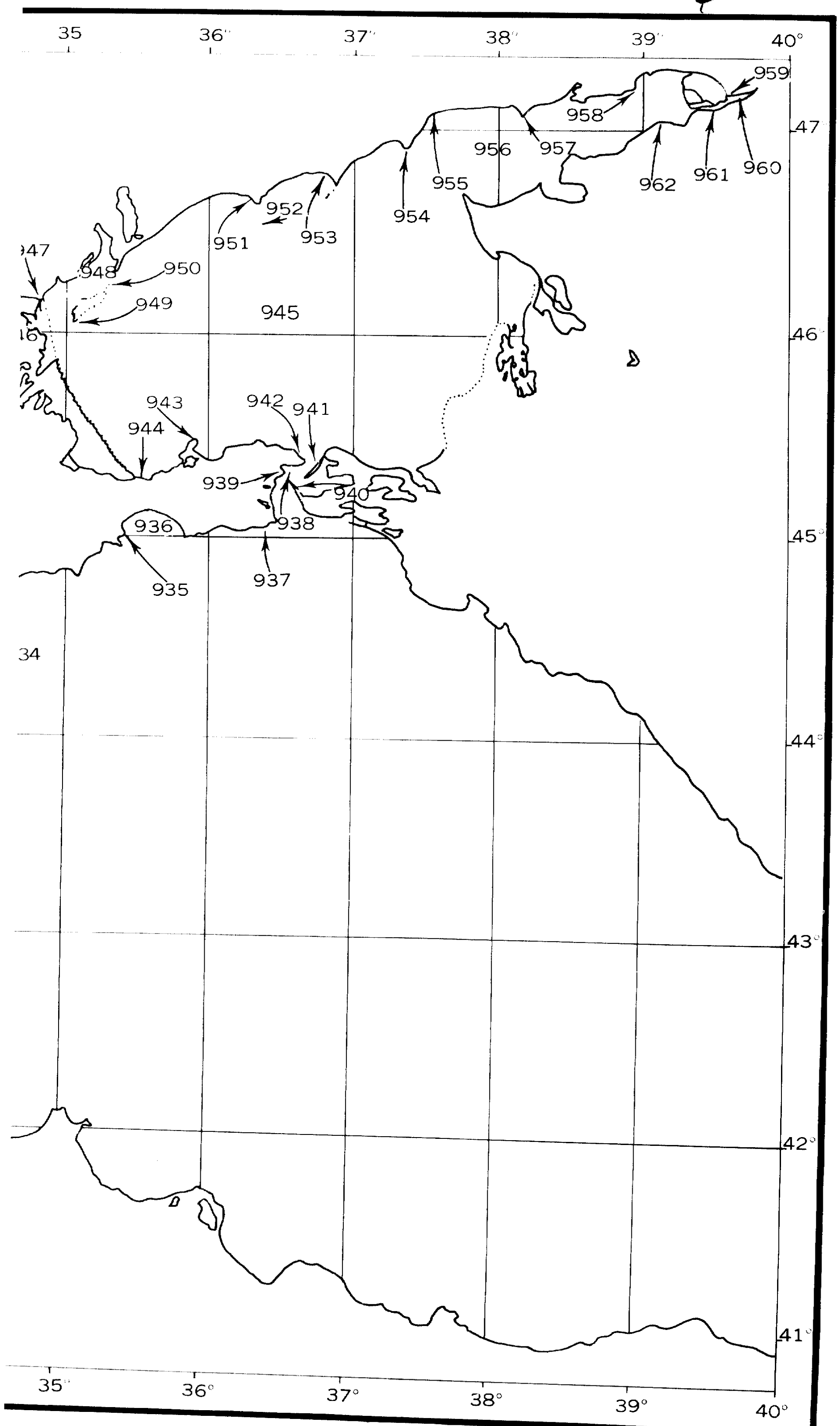


FIGURES III - 52. *Location map: West Coastal Sector.*
Names of places indicated by numbers are given in the accompanying list. These numbers appear in parentheses after the place names throughout the text.

KEY TO FIGURE III-52

801. Gulf of Finland
802. Vyborg (Viipuri)
803. Trongsund
804. Proliv Koyviston Salmi
805. Vyborgskiy Zaliv
806. Ostrov Tiurinsari
807. Ostrov Koyvisto
808. Banka Verkkomatala
809. Seyvyaste (Seivästö)
810. Mys Lysiy Nos
811. Leningrad, mouth of Neva
812. Nevskaya Guba
813. Kronshtadt
814. Tolbukhin Mayak
815. Ostrov Seyskari (Seiskari)
816. Ostrov Karavalday
817. Koporskaya Guba
818. Luzhskaya Guba
819. Luga
820. Mys Pykhli-Sari
821. Narva Laht
822. Narva-Jõesuu
823. Mahu
824. Vaindlo
825. Mokin
826. Käsmu Laht
827. Eru Laht
828. Hara Laht
829. Kolga Laht
830. Keri
831. Naissaar
832. Tallinn
833. Tallinna Laht
834. Suurupi
835. Pakri Neem
836. Paldiski
837. Suur-Paki Saar
838. Ostrov Osmussaar
839. Paldiski Laht
840. Vaike-Pakri Saar
841. Voosi Kurk
842. Hari Kurk
843. Tahkuna
844. Kõpu Poolsaar
845. Hiiumaa
846. Vormsi
847. Haapsalu
848. Matsalu Laht
849. Soela Väin
850. Kassaare Laht
851. Raugi
852. Muhu
853. Muhu Väin
854. Vilsandi
855. Mys Kiipsaar
856. Saaremaa
857. Kübassaar
858. Võilaid
859. Pärnu Laht
860. Pärnu
861. Kihnu
862. Ainazi
863. Rīga
864. Daugava
865. Mērsrags
866. Gulf of Riga
867. Ruhnu
868. Roomassaare
869. Abruka
870. Suur Katel
871. Sõrve Nina
872. Kolkasrags
873. Irbeni Väin
874. Miķelbāka
875. Ovisi
876. Ventspils
877. Akmeņrags
878. Liepāja
879. Pape
880. Klaipėda
881. Zeyetif
882. Kurisches Haff
883. Kaliningrad (Königsberg)
884. Mys Bryusterort (Brüster Ort)
885. Baltiysk
886. Frische Nehrung
887. Gulf of Danzig
888. Frisches Haff
889. Eblag (Elbing)
890. Baltic Sea

FIGURE III-53
LOCATION MAP
JANIS 40
[redacted]



map: South Coastal Sector.
in the accompanying list. These numbers appear
ice names throughout the text.

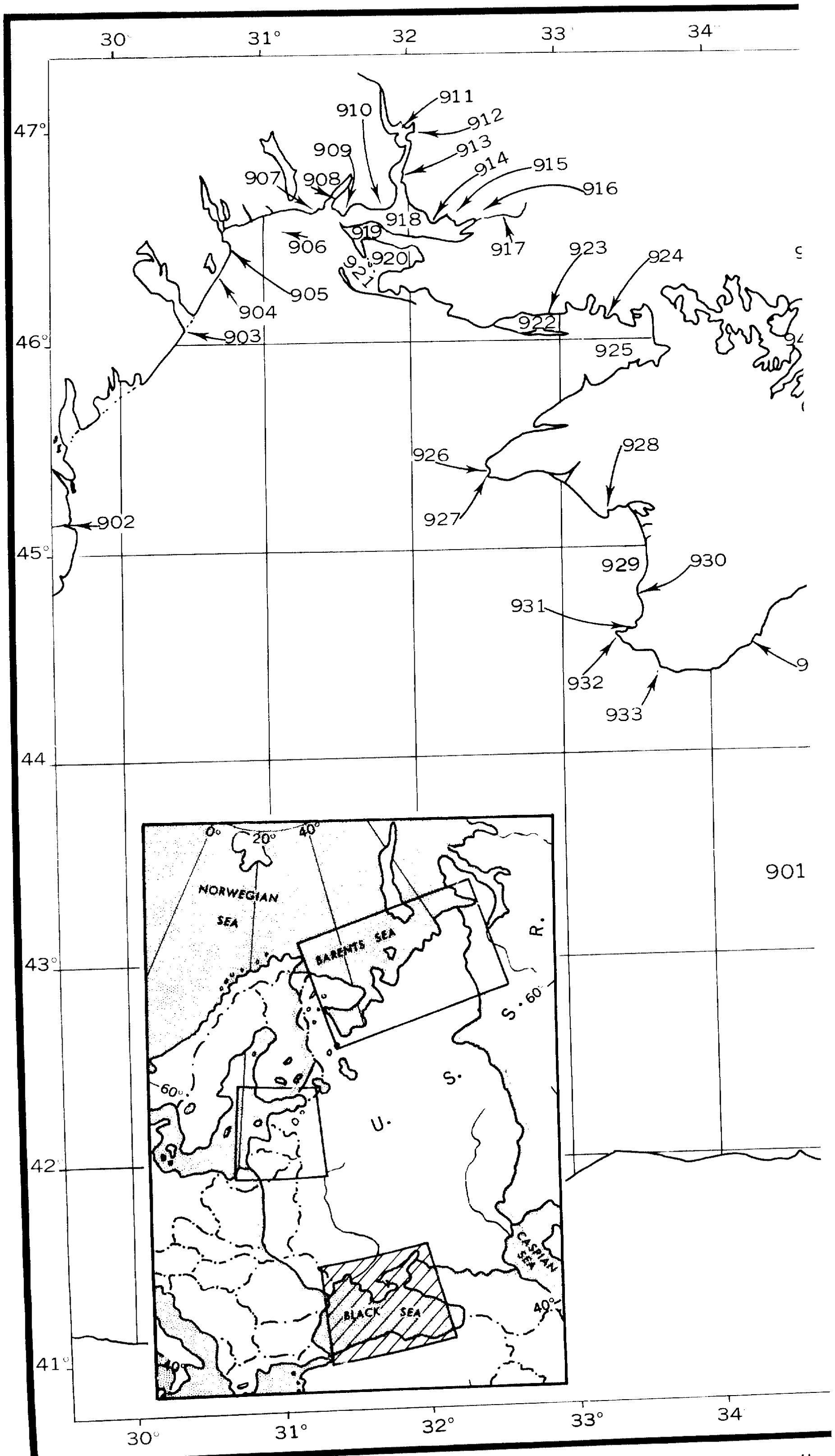


FIGURE III - 53. *Location*
Names of places indicated by numbers are giver
in parentheses after the pla

[redacted]

KEY TO FIGURE III-53

901. Black Sea
902. Sulina, mouth of Danube
903. Dnestrovsko-Tsaregrad-skiy Mayak
904. Mys Bol'shoy Fontan
905. Odessa
906. Odesskaya Banka
907. Berezanskaya Zapadnaya Kosa
908. Berezanskiy Liman
909. Mys Ochakovskiy
910. Adzhigiol
911. Yuzhnyy Bug
912. Nikolayev
913. Svyatotroitskiy
914. Stanislav
915. Kasperovka
916. Kherson
917. Dnepr
918. Dneprovskiy Liman
919. Kinburnskaya Kosa
920. Yegorlytskiy Zaliv
921. Tendrovskiy Zaliv
922. Dzharylgachskiy Zaliv
923. Skadovsk
924. Khorly
925. Karkinitskiy Zaliv
926. Bukhta Karadzhinskaya
927. Mys Tarkhankut
928. Yevpatoriya
929. Kalamitskiy Zaliv
930. Mys Lukull
931. Sevastopol'
932. Mys Khersoneskiy
933. Mys Sarych
934. Yalta
935. Feodosiya
936. Feodosiyskiy Zaliv
937. Mys Kyz-Aul
938. Kerchenskiy Proliv
939. Kerch'
940. Kosa Tuzla
941. Kosa Chushka
942. Yenikale
943. Mys Kazantip
944. Arabat
945. Azovskoye More
946. Sivash
947. Genichesk
948. Utlyukskiy Liman
949. Ostrov Biryuchiy
950. Kosa Fedotova
951. Obitochnaya Kosa
952. Otmel' Kosy Obitochnoy
953. Osipenko
954. Kosa Belosarayskaya
955. Mariupol'
956. Taganrogskiy Zaliv
957. Kosa Krivaya
958. Taganrog
959. Rostov-na-Donu
960. Don
961. Azov
962. Kosa Ochakovskaya

Published by

THE JOINT INTELLIGENCE STUDY PUBLISHING BOARD

Intelligence Division, War Department General Staff *Office of Naval Intelligence*

Office of Assistant Chief of Air Staff-2, Air Intelligence Division *Office of the Chief of Engineers*

Special Assistant to the Secretary of State for Research and Intelligence

WASHINGTON, D. C.

Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6

~~Confidential~~

U. S. GOVERNMENT PRINTING OFFICE
1431—S—1948

Approved For Release 2003/05/14 : CIA-RDP79-01144A000200010003-6